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ROCK PRODUCTS AND QUARRY

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AUGUST, 1941

Domestic Potash Supply Ample . . . Rock-and-Sand Plant one of South's Best
A. S. T. M. Talks Aggregates, Cement, Lime . . . Handling Sand by Gravity

America's

No. 1 Loading, Hauling, Dumping Unit

Brooks LOAD LUGGER

Use 5 to 10 dump buckets with each Load Lugger

Great for quarrying or road building

With the defense program going into high gear, the demand for Brooks LOAD LUGGERS is setting new records.

On government projects and industrial work . . . wherever loading is done by the use of hand labor . . . this safe, modern method of handling materials is first choice of engineers and contractors who want to save time, cut costs and boost their profits.

This preference is based on the simplicity and economy of the LOAD LUGGER . . . the result of sound design and exclusive features:—

LOW HEADROOM
FAST DUMPING
TILT-TYPE BUCKETS
ONE-MAN CONTROL
POWERFUL HOISTS
JACK-LEG SUPPORT
CORRECT LOAD DISTRIBUTION
NO SHIFTING OF LOAD

New Catalog!
Sent on request

Nested Buckets

Sturdy One-Piece Construction

Prove it on the job! Ask about our Special Introductory Offer

Brooks EQUIPMENT AND MFG. CO.

108 Davenport Road

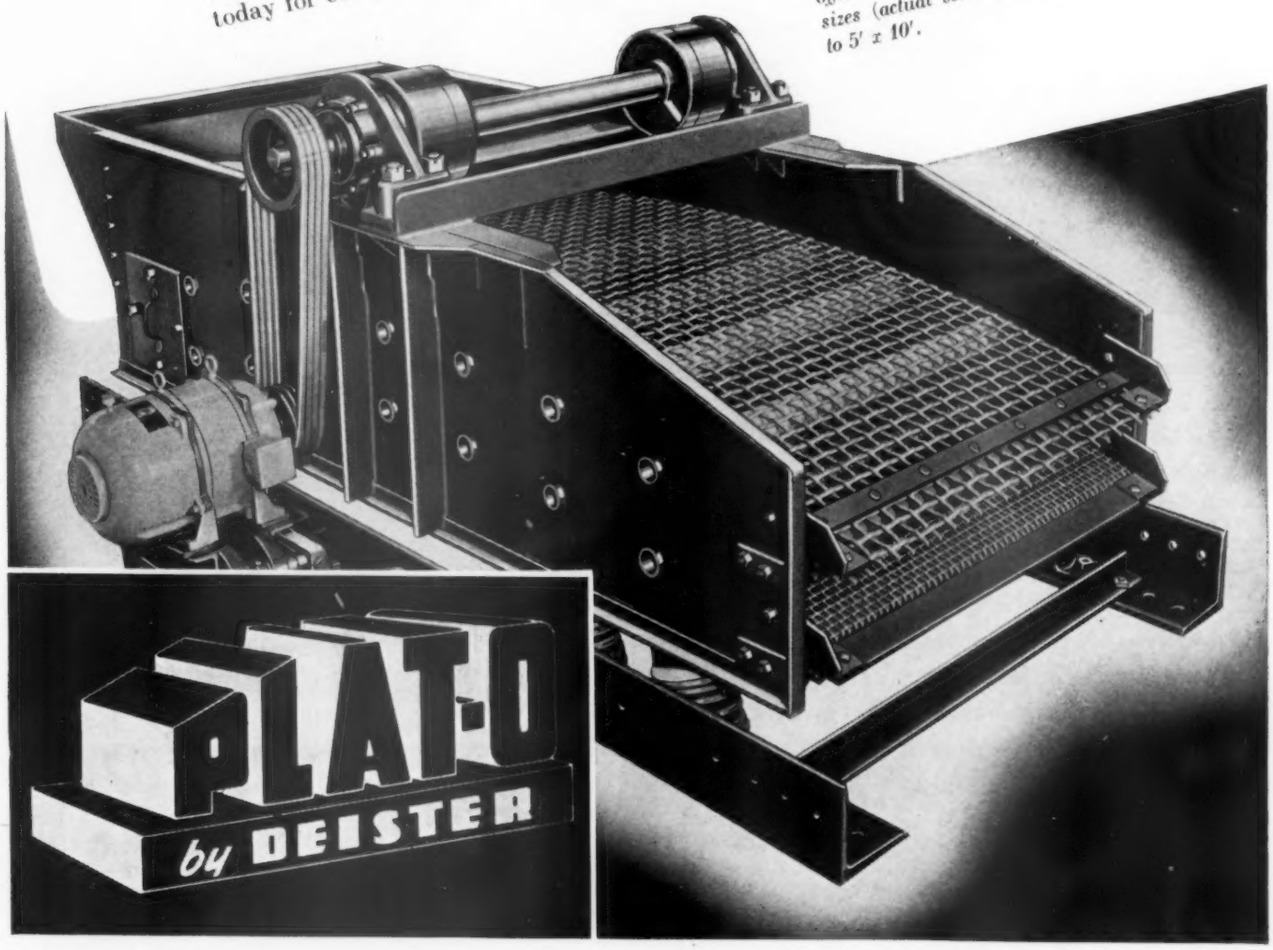
Distributors in all Principal Cities

Knoxville, Tennessee

BETTER THAN 10,000 WORDS

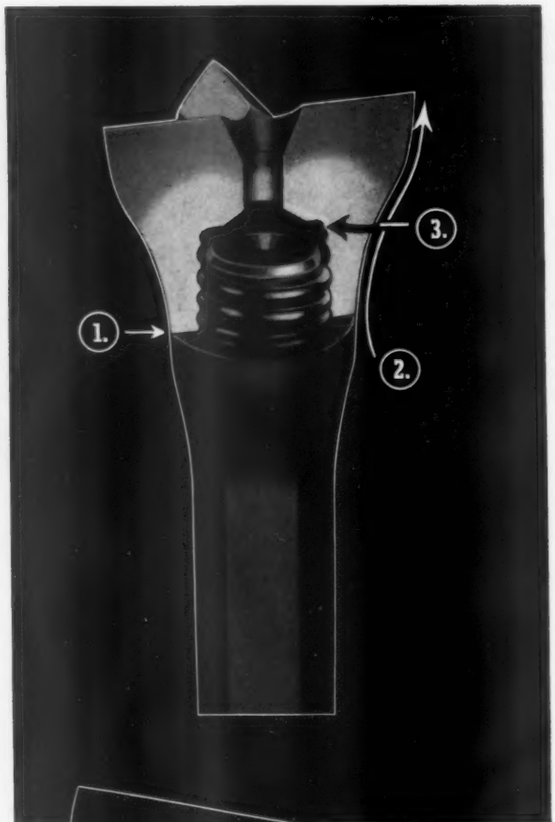
Like a picture, one *repeat* order is worth 10,000 words when it comes to describing the consistently high standard of performance demonstrated by Deister PLAT-O Vibrating Screens in all types of screening operations. Today, 41% of PLAT-O sales are *repeat* orders . . . orders from *satisfied* customers . . . customers who—once accustomed to PLAT-O's fast, accurate and economical grading—are never again content with anything less than PLAT-O. PLAT-O gives you all the features of design and construction that assure increased tonnage at a lower cost per ton . . . powerful, positive vibrating mechanism—actual automatic screen cloth tension—oil lubrication—simple, rugged construction—fully cushioned vibration—maximum dependability and minimum maintenance costs. These are just a few of PLAT-O's outstanding advantages . . . write today for complete information. Deister Machine Company, Fort Wayne, Indiana.

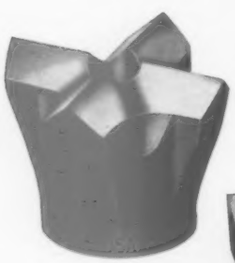
Deister PLAT-O Vibrating Screens are offered in one to three-deck models and in sizes (actual screening area) of 2½′ x 4′ to 5′ x 10′.



It's

"100 to 1" that one of these fits your DRILLING JOB

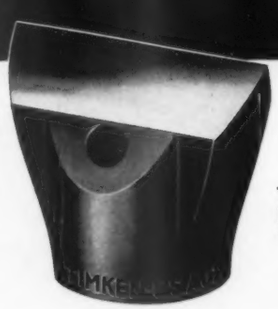




The TIMKEN "H" Series Bit, a general purpose bit for contracting, mining and quarrying with light and medium weight drills.

The TIMKEN "M" Series Bit—an intermediate type to fill the gap between the "D" and "H" series.

The TIMKEN "R" Series Bit used in soft formations such as limestone and sandstone.



The TIMKEN "J" Series Bit used in hard formations and ravelled rock.

The TIMKEN "D" Series Bit for heavy mining and quarrying to be used on the more powerful drifters, and on wagon, and tripod drills with the larger sections of steel.

The design of the TIMKEN Rock Bit is fundamentally correct in theory and on the job. In the nine years that the TIMKEN Bit has been in general use, five series of bits, shown here, have evolved —one of which will fit your drilling job. These different series have the following in common:

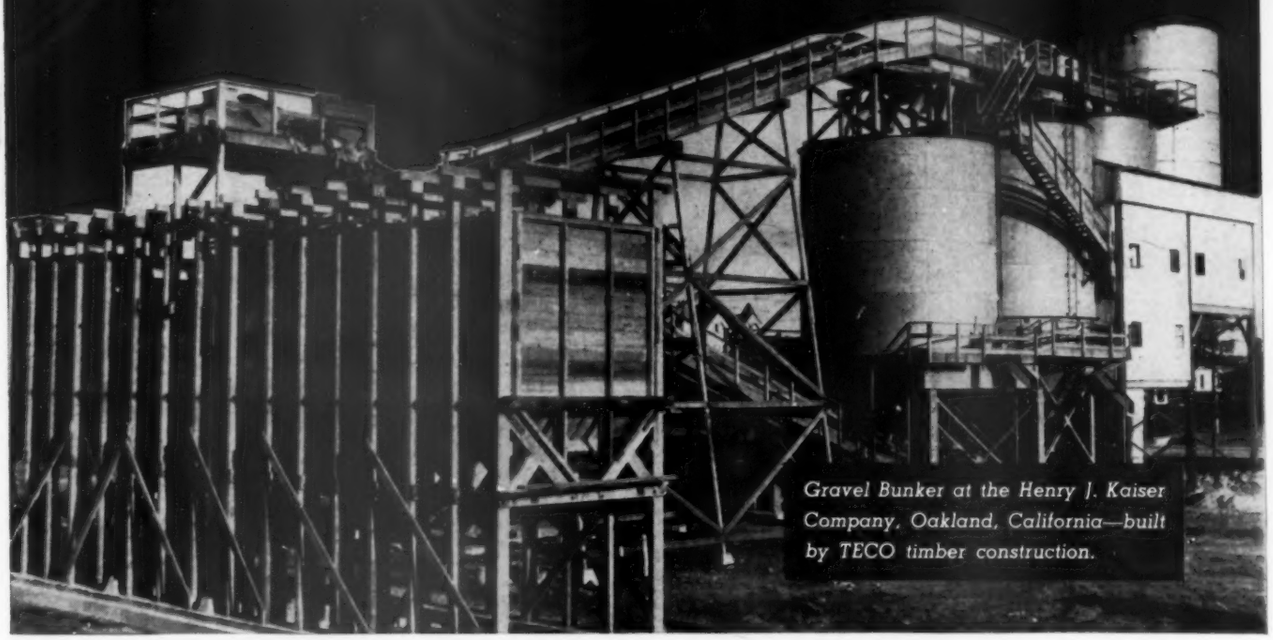
(1) The shoulder, not the threads, takes the shock. The threads merely serve to hold the bit on the steel. This assures easy removability—less thread wear and less pin breakage. (2) The union of bit and steel is flush—a feature that permits streamlined construction and results in less "stuck" steel and faster drilling. (3) There is definite clearance between the end of the steel and bottom of the bit—result, the steel cannot "mushroom" in the bit.

Write us giving full details of your drilling operations and we will make definite recommendations at no cost to you.

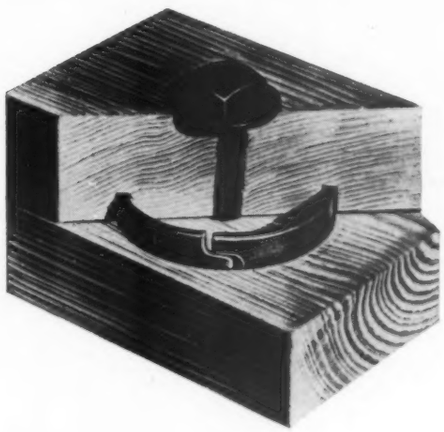
THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN
ROCK BITS

TIMBER Was Chosen For This Tough Task!



Gravel Bunker at the Henry J. Kaiser Company, Oakland, California—built by TECO timber construction.



Where Toughness Counts .. Count on Timber!

Few raw materials, by bulk, are heavier and rougher than gravel.

Gravel bunkers must take constant pounding, grinding and thumping and support a pressure that only the toughest construction could stand.

The TECO System of timber construction builds bunkers that can "take it". TECO Connectors bring the whole toughness of timber into play by strengthening the joints to stand greater stresses.

Send the coupon for detailed information as to how TECO Connectors can help in *your* construction problems!

THE *TECO* RING *CONNECTOR* *spreads the load on a timber joint over practically the entire cross-section of the wood . . . brings the full structural strength of lumber into play.*

TIMBER ENGINEERING COMPANY, INC.
1337 Connecticut Avenue
Washington, D. C.

Tear Out . . . . MAIL TODAY!

Timber Engineering Company, Inc., Dept. AK-8
1337 Connecticut Avenue, Washington, D. C.

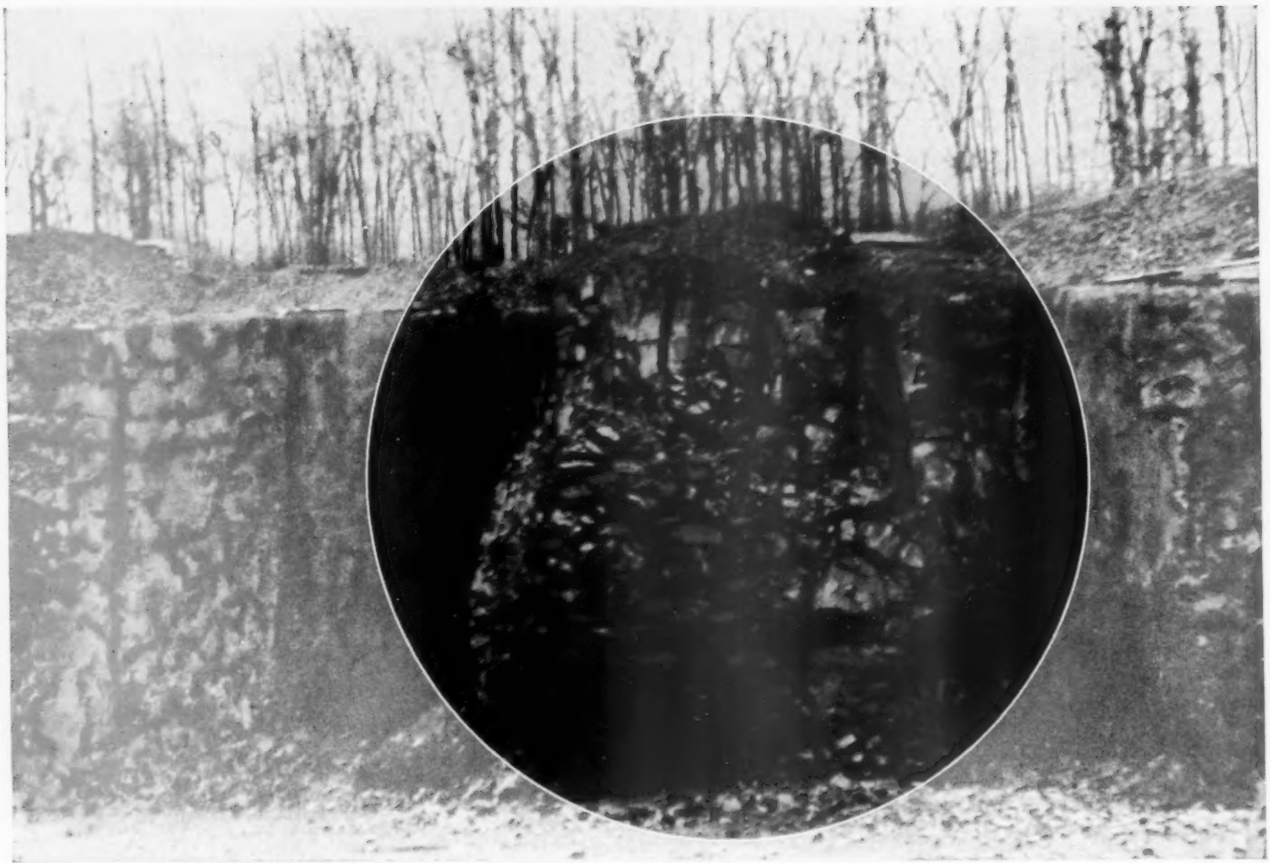
Please send us complete information on the TECO Connector System of timber construction.

Individual.....

Firm.....

Street.....

City..... State.....



Where CONTROL spells e-c-o-n-o-m-y!

A PHOTOGRAPH like this is a treat to the eye of cost-minded quarry men. Just see that rock walking out toward the camera! The bulge in the face, and the slight lift at the crest, indicate that the shot is just about perfectly balanced. When you bring rock down like this, you bring costs down too!

In this blast at Commonwealth Quarry Co., Summit, N. J.—as in so many others from coast to coast—results are traceable directly to the combination of Atlas Explosives and Atlas methods. Ask the Atlas Representative to show you what this combination can do in your own quarry!

ATLAS EXPLOSIVES

"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington, Del. • Offices in principal cities • Cable Address—Atpowco

WHAT! ONLY 300 WATTS

TO OPERATE THIS ELECTRIC SHOVEL'S CONTROLS?

P&H

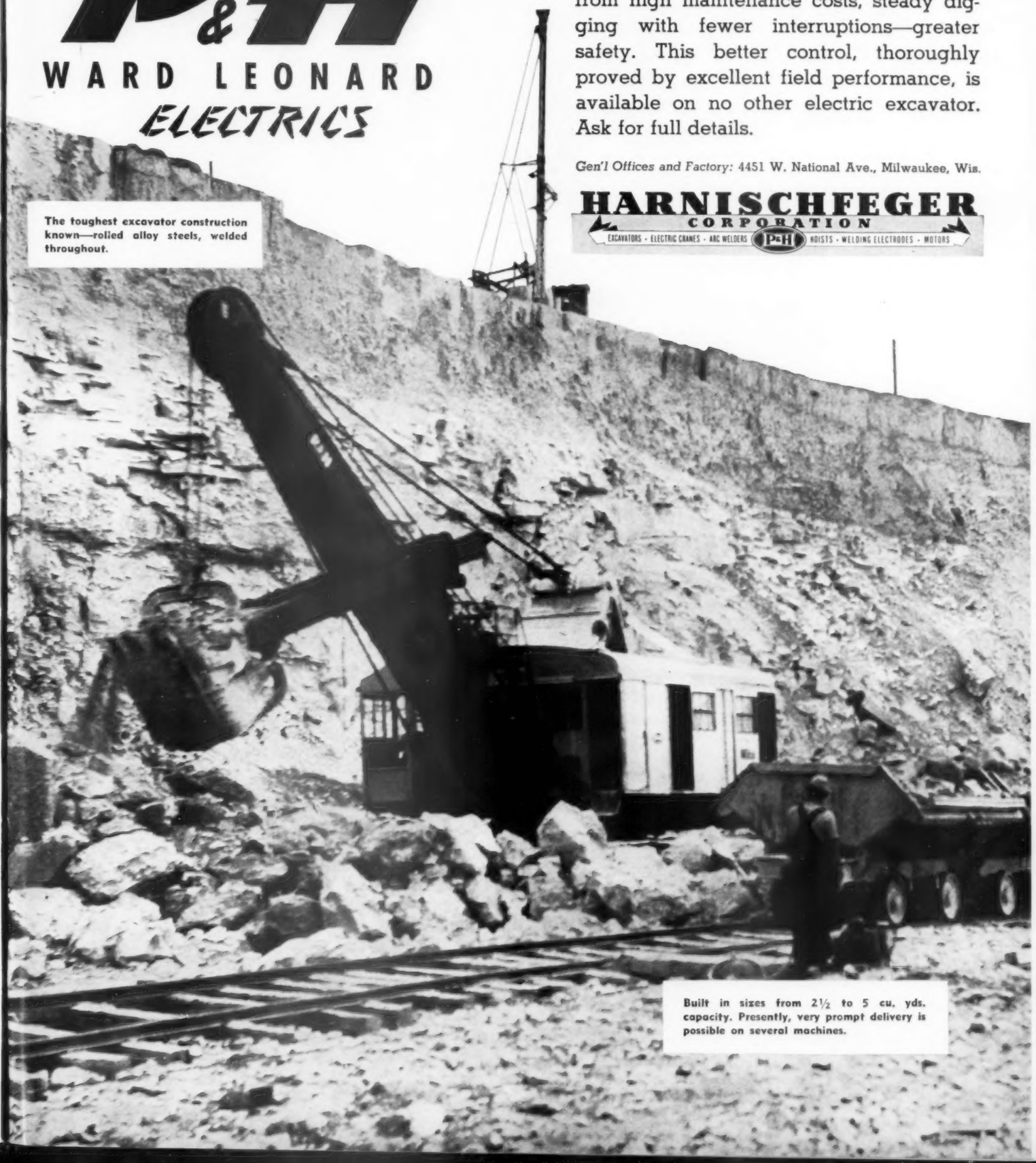
WARD LEONARD ELECTRICS

Yes, in this outstanding "Double" Ward Leonard Electric control, current loads are reduced 96%. To you it means freedom from high maintenance costs, steady digging with fewer interruptions—greater safety. This better control, thoroughly proved by excellent field performance, is available on no other electric excavator. Ask for full details.

Gen'l Offices and Factory: 4451 W. National Ave., Milwaukee, Wis.

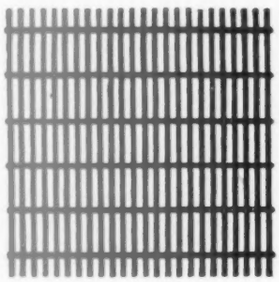
HARNISCHFEGER CORPORATION

EXCAVATORS · ELECTRIC CRANES · ARC WELDERS · P&H · HOISTS · WELDING ELECTRODES · MOTORS



The toughest excavator construction known—rolled alloy steels, welded throughout.

Built in sizes from 2½ to 5 cu. yds. capacity. Presently, very prompt delivery is possible on several machines.



Rolled Slot

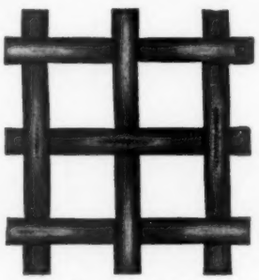
ALLOY No. 2

A super wearing Steel developed to resist the abrasion and vibration of modern screening demands.

"CLEVELAND" SCREENS

A wire cloth of guaranteed accuracy backed by fine workmanship and an effort to satisfy.

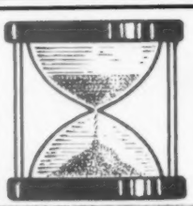
Available in Square Mesh and Rolled Slot. A trial will convince you of the superiority.



2 Mesh .162 Ga.

THE CLEVELAND WIRE CLOTH & MFG. COMPANY
574 E. 78th St. CLEVELAND, OHIO

When Time is the Factor



Trade Mark

is the Answer

Loaded containers ready for pick-up

All out at the dump! The quick, easy way

The Army . . . the Navy . . . and the Air Corps are calling on every source of supply to "Speed-it-up."

They are using DEMPSTER-DUMPSTERS in their operations. Many of their "Feeders," including the Steel Mills, Crushed Stone Plants, Aluminum Manufacturers, Lime Quarries and Cement Plants, have standardized on the BUCKETRUX to assist in the big push to get maximum efficiency in the production line.

The standard DEMPSTER-DUMPSTER handles all types of Detachable Containers, and the Units are built to service Buckets carrying net payloads from 6,000-lbs. to 12,000-lbs.

Catch up with progress—Use DEMPSTER-DUMPSTERS.

Call or wire for information.

DEMPSTER BROTHERS, Inc. KNOXVILLE, TENNESSEE **U. S. A.**

SATISFACTORY PERFORMANCE brings *Repeat Orders*

A survey of Symons Crushers in service reveals the prevalence of repeat orders. It is common for Cone Crusher users to order a second machine because of the satisfactory performance of the original installation. It is also interesting to note the large number of major producers of crushed materials who have standardized on Symons Cones for their reduction crushing operations. One user alone has 27 Cones, another 16, another 14, while there are many crushing plants in both the metallic and non-metallic fields that have 4 to 6 Cones engaged in fine crushing work. That the use of Symons Cones has spread so rapidly throughout the world and this machine has become the accepted crusher for fine reduction work can only be accounted for in the unusual performance of these crushers.

Symons Cones are built in two types and a range of sizes suitable for plants of limited capacity up to the largest producers of crushed materials.

NORDBERG MFG. COMPANY MILWAUKEE WISCONSIN

NEW YORK 60 East 42nd Street | LOS ANGELES Subway Terminal Bldg. | LONDON Bush House | TORONTO Concourse Bldg.

SYMONS CONE CRUSHERS

BIG SHOT OR BIRD SEED?

—*you make the choice*

Ever know a top executive who didn't get around? Well, that's your cue now. You have never needed a fresh outlook more—with the comfortable old world falling about your ears. What are you going to do about it?

Hundreds of the brightest minds in business are getting together in September at the Royal York Hotel, Toronto, Canada, for the annual N.I.A.A. Conference.

Many of them are working now to bring you their interpretation of today's perplexing problems of industrial marketing. You could not buy this wealth of experience for a fortune.

Yet it is all yours for the price of a registration ticket, train fare and three days' hotel. Make up your mind to be in Toronto on September 17 and send in your registration now.

- It is easy for United States citizens to come and go across the border — no special forms or red tape required.
- The Royal York Hotel is the largest in the British Empire—all sessions, exhibits and panels on the one convention floor.
- Canadian industry has had to face for two years the conditions now confronting us. This experience can help to steer you straight.
- Some subjects on the Program: Industrial Advertising in a Wartime Economy — Institutional Advertising — Information Plus—Industry Looks Ahead — Advertising Analysis—Putting Sales Tools to Work—and many others.

Make this note in your diary

19th ANNUAL N.I.A.A. CONFERENCE

TORONTO, CANADA-SEPTEMBER 17, 18, 19

NATIONAL INDUSTRIAL ADVERTISERS ASSOCIATION, INC.
100 EAST OHIO STREET **CHICAGO, ILLINOIS**

TELSMITH

flexibility

FITS THE PLANT TO ITS MARKET

● Faced with a diminishing deposit, the Kelly Run Stone Co. decided early in 1938 not only to open a new quarry higher on South Mountain but to erect a completely new 125-150-ton-per-hr. rock crushing plant about six miles southeast of Wilkes-Barre, Pa.

Their well established market demanded products to suit widely varying specifications. This called for a plant of extreme flexibility. They have just that. Its design and construction was supervised by their Gen. Mgr., B. C. Banks, with Telsmith's engineering co-operation.

In large part this plant's flexibility is due to its Telsmith equipment. The 72″ x 25′ Telsmith Roller Bearing Rotary Scalping Screen insures quality grading and cleanliness. Plus 4″ rock or tailings from scalper are chuted to the 13-B Telsmith Gyratory Secondary Crusher (Fig. 1) and its product in turn goes back to the scalper. Thus either ballast or modified base coarse stone may be produced in the scalping bin and trucked from there. The "parallel pinch" of the Telsmith Gyratory quickly reduces large pieces at top of bowl. Operating at an eccentric speed of about 220 rpm, its capacity is high. And its super-strong steel frame and crown and unbreakable shaft insure continuous output.

A No. 36 Telsmith Gyrasphere Crusher (Fig. 2) serves as a finishing crusher, taking raw feed from scalping bin, also tailings and unwanted sizes from main bin. By varying percentage of feed and crusher's settings, proportions are controlled and various sizes in the amounts needed are produced.

Four finishing screens produce a total of 6 possible sizes, in addition to dust—two 4′x10′ Telsmith Double Deck Pulsators delivering 3 sizes to main bin compartments on one side of elevator, and two other screens delivering to other side.

Do you want flexibility in your plant, with low-cost operation and maintenance? Write for Bulletin Q-15.

1

2

Q-5

SMITH ENGINEERING WORKS, 504 EAST CAPITOL DRIVE, MILWAUKEE, WISCONSIN

Cable Addresses: Sengworks, Milwaukee—Concrete, London

Room 1604—50 East 42nd St. New York City
211 W. Wacker Drive Chicago, Ill.
713 Commercial Trust Bldg. Philadelphia, Pa.
19-21 Charles St. Cambridge, Mass.
Vurn Wheeler Eqpt. Co. Columbus, Ohio
Brandeis M. & S. Co. Louisville, Ky.
Charleston Tractor & Eqpt. Corp. Charleston, W. Va.
Roanoke Trac. & Eqpt. Co. Roanoke, Va.
Choctaw C. & M. Co. Memphis, Tenn.
Wilson-Weesner-Wilkinson Co. Knoxville and Nashville, Tenn.
G. F. Seeley & Co. Toronto, Ont.

Other Methods are too Expensive-

THERE is no question about the economy of Bucket Loaders. For twenty years they have loaded material cheaper than any other method or machine.

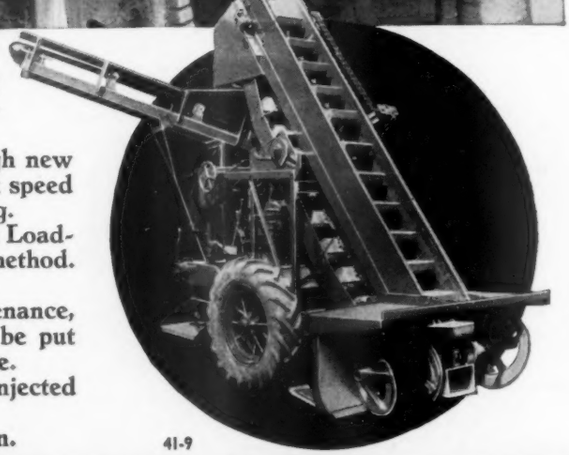
Now the B-G Model 522 offers a new economy through new portability. Not just greater ease in maneuvering—but truck speed towing—with quick and easy hitching—with no dismantling.

This new portability greatly increases the scope that the Loader can cover. It practically obsoletes every other loading method. It makes every other means too expensive.

Simpler systems are now feasible. In highway maintenance, for instance, small roadside stockpiles at the job site can be put down in advance, loaded as needed with the Barber-Greene.

In addition to this new portability, Barber-Greene has injected many other new features into this ingenious design.

Write for complete information. There is no obligation.

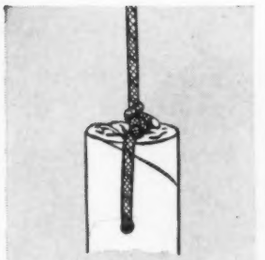


41-9

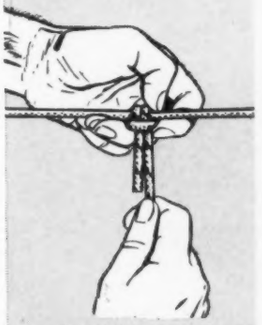
BARBER GREENE

STANDARDIZED MATERIAL HANDLING MACHINES

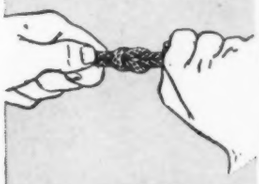
AURORA ILLINOIS



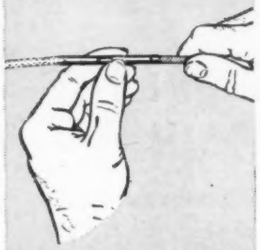
1. Tie through cartridge.



2. Half hitch branch to main line.



3. Connect main line lengths with *square* knot.



4. Fuse and cap on end of main line.

IMPORTANT

Branch lines should lead away from main lines at *right angles*. Avoid kinks and small loops.

More Work from Explosives

Velocity, strength, and density influence the shattering power of an explosive. Primacord insures high velocity throughout the charge. It carries an extremely powerful detonating wave along its entire length at a speed of 3.9 miles per second. Since this is faster than the rate of propagation in most explosives, the velocity at which the entire charge is detonated is stepped up to the rate of propagation in Primacord. Obviously, the shattering effect of the charge is increased, resulting in more work from your explosives when Primacord-Bickford Detonating Fuse is used. Send for the Primacord booklet.

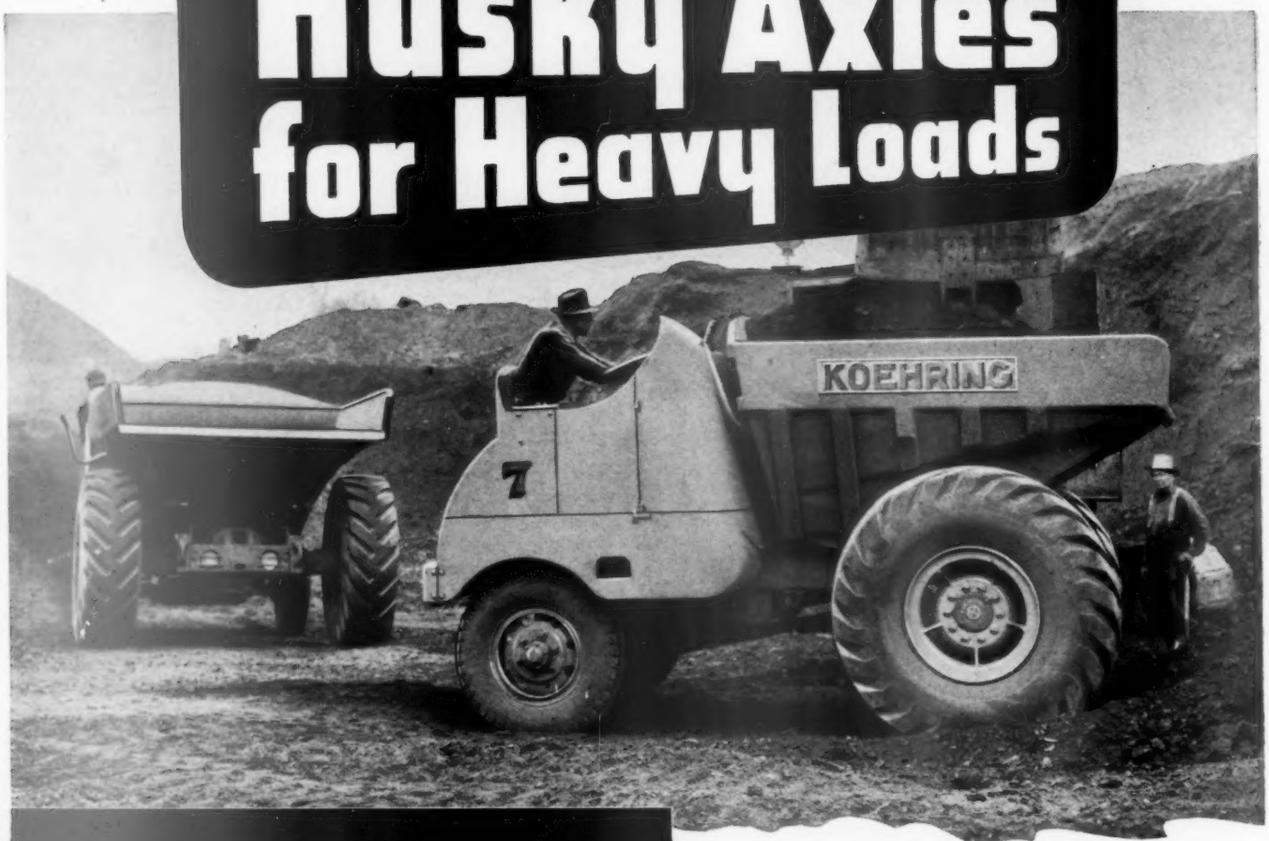
PB-35

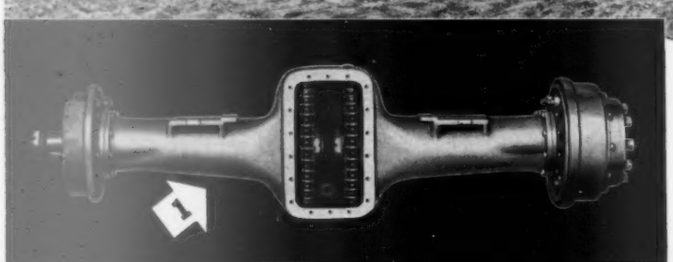
PRIMACORD BICKFORD
Detonating Fuse

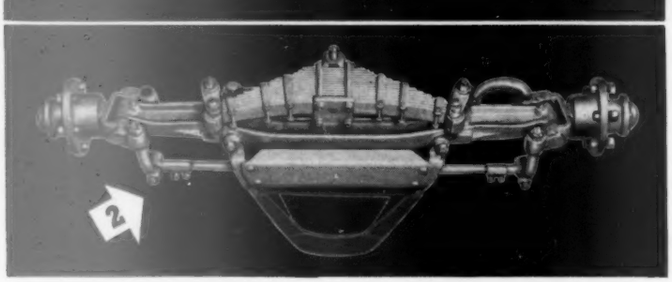
THE ENSIGN-BICKFORD COMPANY • SIMSBURY, CONN.

Makers of Cordeau-Bickford Detonating Fuse — and Safety Fuse since 1836

Husky Axles for Heavy Loads







1 Alloy steel drive axles housed in one piece alloy steel casting. Anti-friction bearings, splined shafting, alloy steel sprockets and chain.

2 Free oscillating, spring mounted, steering axle eliminates frame bending strains, when traveling over uneven grades.

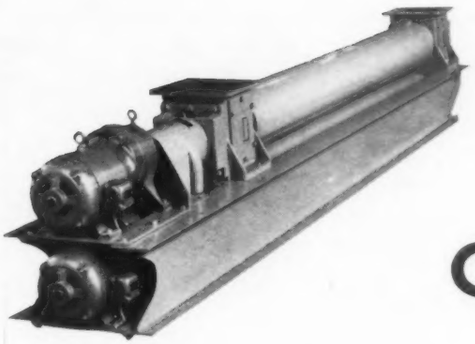
KOEHRING DUMPTORS SCORE AGAIN

Another Koehring Dumptor success story . . . Open pit mine operators have recognized and accepted the flexibility and economy of Dumptors for hauling iron ore and stripping. Heavy loads of iron ore, approximately 4000 pounds per cubic yard, are easily carried by the husky Dumptor axles . . . designed and built for heavy loads. Satisfactory service with surprisingly low upkeep cost, under mine operation conditions, means long-lasting service on dirt and rock hauling jobs. Why don't you use Koehring Dumptors on *your* job? The investment is low, upkeep cost is low, more yards per hour are moved, your cost per yard is reduced. You can move *more* dirt or rock at lower costs, with Koehring Dumptors.

KOEHRING CO., *Milwaukee, Wis.*

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT



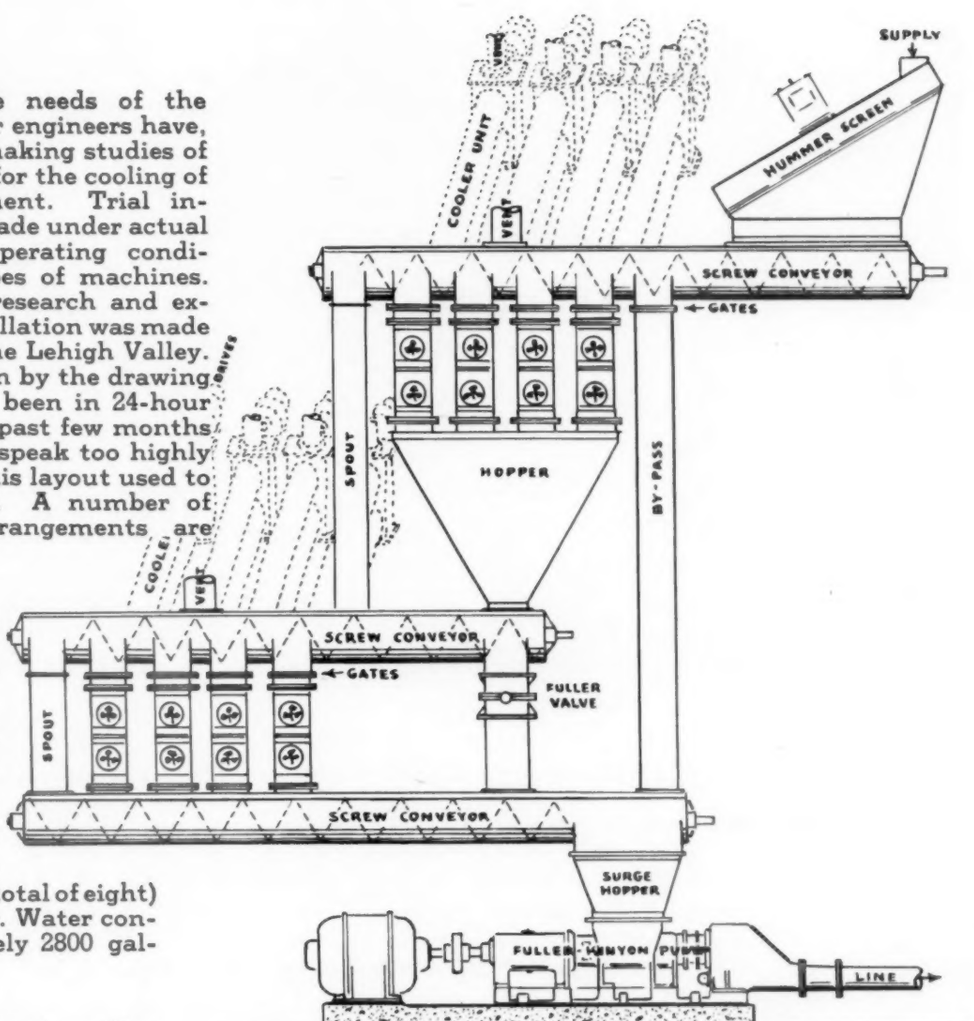
Fuller Cement Cooler Unit,
50 barrels capacity.

THE FULLER CEMENT COOLER

Always alert to the needs of the cement industry, Fuller engineers have, for a long time, been making studies of equipment and means for the cooling of finished Portland cement. Trial installations have been made under actual manufacturing and operating conditions with varying types of machines. After this exhaustive research and experimentation, an installation was made in a cement plant in the Lehigh Valley. This installation, shown by the drawing on the right, has now been in 24-hour per day service for the past few months and its owners cannot speak too highly of its performance. This layout used to meet local conditions. A number of other installation arrangements are possible.

Cement is handled at the rate of approximately 400 barrels an hour, the material entering the cooler at an average temperature of slightly over 260°F., and is delivered to the conveying system at an average of 140°F. Power required for driving these coolers (a total of eight) is about 40 horsepower. Water consumption approximately 2800 gallons per 100 barrels.

If you have a cement cooling problem, our engineers will be only too glad to work with you. No obligation on your part.



FULLER COMPANY

CATASAUQUA, PENNSYLVANIA

Chicago: 1118 Marquette Bldg.
San Francisco: 320-321 Chancery Bldg.

CC-1

FULLER-KINYON, FLUXO, AND AIRVEYOR CONVEYING SYSTEMS · · · · ROTARY FEEDERS AND DISCHARGE GATES
ROTARY AIR COMPRESSORS AND VACUUM PUMPS · · · · AIR-QUENCHING COOLERS · · · · BIN SIGNALS

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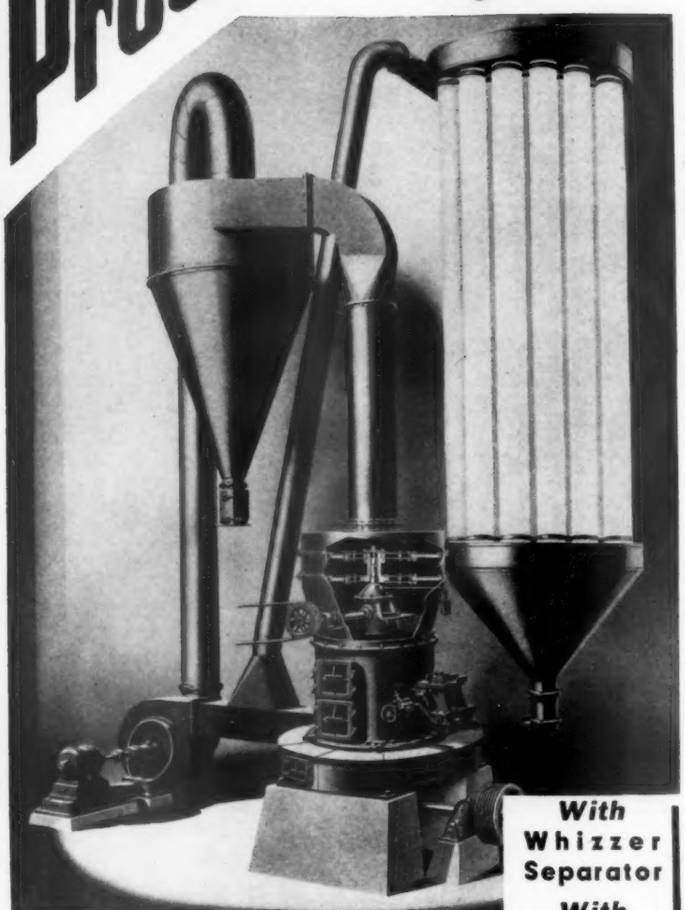

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With Drying System

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SINCE 1887

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DEC 19 1941

PIT AND QUARRY

Vol. 34 AUGUST, 1941 No. 2

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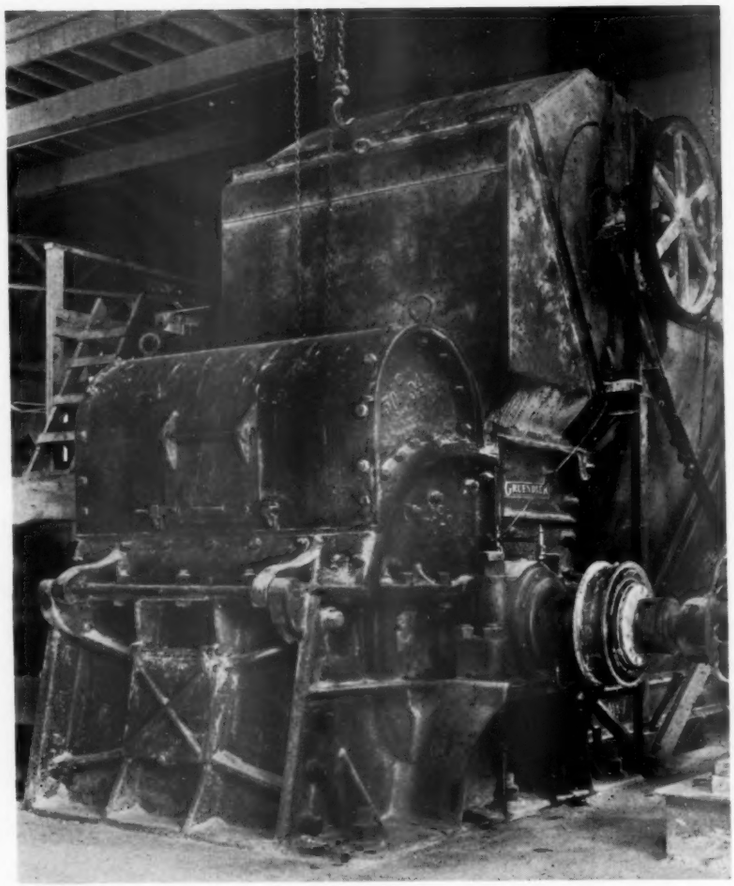

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PIT AND QUARRY

CHICAGO AUGUST, 1941

J. E. Baker, Pioneer in Lime and Dolomite Fields, Dies at 81

Ill for several weeks of a heart ailment, John E. Baker, 81, one of the nation's pioneer lime and limestone producers, died at his "Oak Orchard" home at York, Pennsylvania recently.

In 1889 Mr. Baker leased a quarry and kilns at Wrightsville, and operated them under the name of the Wrightsville Lime Company. In 1894 he began operations at Billmeyer, near Marietta, Lancaster County, which is at present the main plant of the J. E. Baker company of which he was president. In 1904 the Wrightsville Lime Company was absorbed by the J. E. Baker Company, which operated six plants.

The story is told of an interesting experience Mr. Baker often recalled as a pioneer in the production of American dolomite. Mr. Baker's business was developing. He had acquired a new limestone deposit, had had the stone analyzed and proceeded to Pittsburgh to the offices of the Carnegie Steel Company to explain why he thought Carnegie should become one of his customers. Ordinary limestone was selling at 50 cents a ton and Mr. Baker believed he had a quality that would appeal to his prospect.

Carnegie Steel's purchasing agent accepted the sample offered and the analysis of the chemist. Suddenly he said:

"Why, Mr. Baker, you have dolomite. Where did you get it?"

"Yes, I know. I have a considerable number of acres of it."

Afterwards Mr. Baker admitted that when the word "dolomite" was thrown at him it was a new addition to his vocabulary and he had no idea what it meant. At that time, nearly 50 years ago, all the dolomite used in American furnaces was imported from Austria and cost nearly $100 a ton.

The Carnegie man asked the price desired by Mr. Baker, who though he multiplied the 50 cents a ton he had expected to get for his limestone several times was yet far away from the $100 a ton the Austrian dolomite commanded.

The order the young lime manufacturer carried back to Wrightsville with him was for far more than his capacity to produce, but he made arrangements to enlarge his plant.

The Carnegie Steel Company is now the Carnegie-Illinois Steel Corporation, but Baker dolomite continues to line its furnaces.

Fire Razes Bentonite Plant in Wyoming

The bentonite mill of the J. J. Mayou Manufacturing Company at Newcastle, Wyoming, was completely destroyed recently by fire which was believed to have started by the overflowing of a fuel tank when oil from the container ran on a heated drying machine. J. J. Mayou, proprietor, said the damage was estimated at $35,000 and that it was not covered by insurance. Two box-cars standing beside the plant also were damaged.

The Mayou plant was one of four bentonite mills operating in Weston County, Wyoming.

Coming Events

January 28-30, 1942—Cincinnati. Annual conventions, National Sand & Gravel Association, and National Ready Mixed Concrete Association. Netherland Plaza Hotel.

February 2-5, 1942—Cincinnati. Annual convention, National Crushed Stone Association. Netherland Plaza Hotel.

Reveals Method for Determining Air Content of Concrete

A new and improved method for determining the air-content of freshly-placed concrete has been developed by the National Bureau of Standards, Department of Commerce.

In this method the measured volume of concrete is inundated with water, vacuum is applied, and the container is agitated by rolling in order to release the air bubbles. The volume of air released is measured by replacement with water.

There are good grounds for believing that the air-content of freshly-placed concrete is a factor which may greatly affect its properties and particularly its weather resistance. For this reason the new development is important.

In using the new method reproducible results were obtained on fairly wet concretes, but the results upon drier concretes were less consistent. This may be attributed to the fact that drier mixes can not be uniformly compacted into the forms.

The use of a finer sand resulted in the incorporation of much more air; more cement in the mix slightly reduced the air content. A number of grinding aids when added to the concrete increased the air content from the normal of one per cent. to as high as 14 per cent. approximately. Fly ash did not appreciably change the air content.

Plant Construction in Missouri, California

The Marblehead Lime Company has built and equipped a new addition to its Hannibal, Missouri plant for the production of ground limestone.

The Pacific Rock & Gravel Company recently established a new $50,000 plant at Torrance, California. W. M. Dewey is in charge.

Operations Start in August at Carrara's New Cement Plant

Scheduled to start production in August, the new plant of the Carrara Portland Cement Company at Carrara, Nevada, will produce white cement of special quality. The company will also produce standard gray Portland cement.

Material from which the cement will be made is white marble and white clay, both present in deposits of great volume. Marble has been quarried from the Carrara deposit at intervals for many years and the supply for the new plant will be drawn from an old open quarry, a mile from the plant.

The capacity of the plant is reported to be 1000 barrels per day. Power for the plant and its various units is provided by Diesel engines delivering a total of 1,100 horsepower. The company has completed a 10-mile pipe-line that conveys its water from the Amargosa River, the flow of which for many miles is underground.

The 150-foot rotary kiln at the plant was purchased from the Chief Consolidated Mining Company in the Tintic district of Utah, where it was formerly used as a volatilizing kiln in the treatment of tailings from concentrating tables. The kiln, weighing 71 tons, was trucked approximately 700 miles to the Carrara site.

Several years ago the deposits were acquired by the Calneva Portland Cement Company which installed a pilot plant for experimental production of cement, under the management of Harry E. Mick, production manager for the present company.

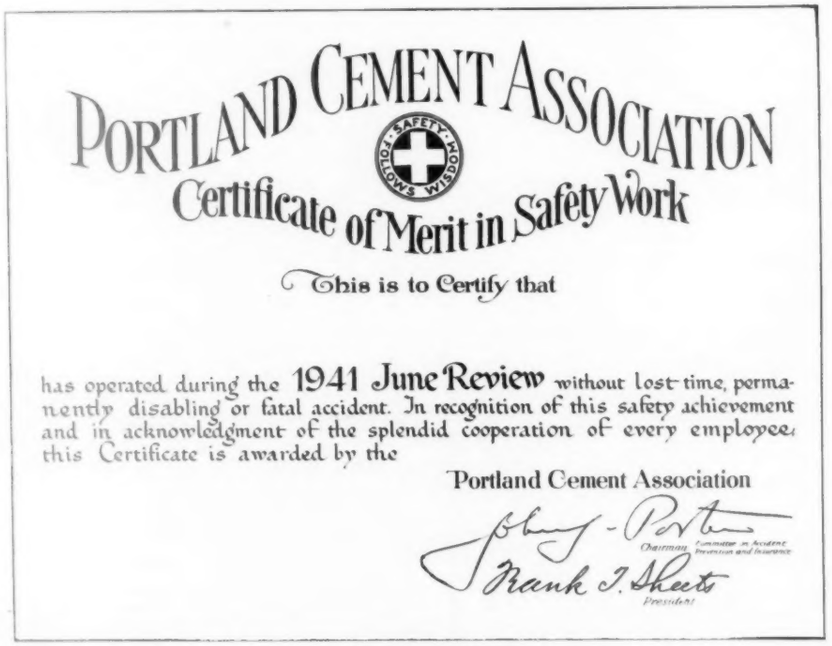
Head of the Carrara Portland Cement Company is Angel M. Elizalde, Philippine Islands industrialist, president of Elizalde & Company, Ltd., general importers with offices in New York and San Francisco and large interests on the islands, including gold mining and virtual control of the hemp and rope-making industry in the Orient.

Other officers of the Carrara company include O. J. Gallagher, secretary; M. Nolan, treasurer; Albert A. Hall, sales manager; Lewis Beedy and John L. Lewis of San Francisco, with Arthur Perkins of Colorado Springs and Emerson J. Wilson of Reno. In general charge for the Carrara Portland Cement Company as directing engineer is J. M. Church Walker, formerly with the Pacific Portland Cement Company.

PCA to Make Patents Generally Available

Patentable inventions resulting from research activities of the Portland Cement Association will be made available to the public in the future so as to expand the use of cement and concrete, according to a resolution at the recent spring meeting of the association.

The directors designated Stephen E. Hurley to hold or dispose of such inventions and association research workers have agreed to assign any such inventions to him.


PORTLAND CEMENT ASSOCIATION

SAFETY FOLLOWS WISDOM

Certificate of Merit in Safety Work

This is to Certify that

has operated during the 1941 June Review without lost-time, permanently disabling or fatal accident. In recognition of this safety achievement and in acknowledgment of the splendid cooperation of every employee, this Certificate is awarded by the

Portland Cement Association

Chairman, Committee on Accident Prevention and Insurance

President

Certificate of Merit given by Portland Cement Association.

115 Plants Operate Without Accidents in June Campaign

Every cement man in 115 manufacturing-plant organizations completed the June Safety Review sponsored by the Portland Cement Association without a disabling injury. The association's Certificate of Merit in Safety Work, individually inscribed, has been awarded each mill which was successful in completing June without a lost-time accident.

Not one June accident occurred in the raw mill, coal-grinding department, power-house, shop, railroad or yard locations in any cement mill reporting to the P.C.A. The quarry and burning departments held the doubtful distinction of contributing the most accidents with 5 each. Next were crushing and finishing with 3 each, cement storage with 2, followed by clay field, packing, and shipping with 1 each.

Seventeen cement mills were forced out of the "Safety Parade" by accidents which caused 4 deaths, 2 permanent injuries and 14 lost-time accidents. Three of the June fatalities, both permanent injuries and 6 disabling injuries were first accidents of the year in 10 of the 17 plants, continuing the reputation of June as the most hazardous month of the year in cement operations.

Victims of the fatal accidents were a crusher foreman, a crusher feeder, a repair man and an electrician. Permanently crippled were a cement stower and an electrician. Forced to lose time from work on account of injuries were 2 foremen, 2 drillers, 2 repair men, 2 laborers, a locomotive runner, a pitman, a hammer-mill operator, a crusher man and an oiler.

With mill activity about one-third greater during the first half of the year than in 1940, 45 per cent. more disabling injuries have been reported to the Portland Cement Association than last year.

Standard Slag to Move Plant to Portsmouth

The crushing and processing plant of the Standard Slag Company at Ironton, Ohio, is to be moved to Portsmouth, Ohio, this fall. Work of construction is expected to start shortly.

Portsmouth is the source of supply and the slag was formerly shipped to Ironton for processing.

A contract to supply the city of Kansas City, Missouri with 2,500 barrels of cement was awarded the Stewart Sand & Material Company recently on its bid of $2.24 per barrel.

Smoot, Other Dredge Workers Not Exempted from Wage-Hour Law

Employees on sand-and-gravel dredges, including those of the Smoot Sand & Gravel Company of Washington, D. C., will not be regarded as seamen and therefore exempt from the benefits of the Wage and Hour Law, General Philip B. Fleming, Administrator of the Wage and Hour Divisition, U. S. Department of Labor, has announced.

The division's stand was announced in commenting on the recent (December 11, 1940) decision of the U. S. Circuit Court of Appeals for the Fifth Circuit regarding the application of the Fair Labor Standards Act to men employed as seamen. Certiorari was denied by the Supreme Court. In the case of *Gale et al v. Union Bag & Paper Corporation,* the court's decision indicated that to be exempt as "seamen" the employees' duties must be concerned with the navigation of the vessel. In July, 1940, when a strike of Smoot workers tied up building construction in the district, General Fleming in a letter to the Smoot Corporation stated that he had reached the conclusion on the basis of the facts submitted to him that the dredge workers involved were "seamen" and therefore exempt from the benefits of the act.

"You understand, of course, that the Administrator's interpretation of the statute is subject to review by the courts, but I propose to adhere to this view unless at some future date my administrative construction is deemed erroneous by a court of competent jurisdiction," General Fleming wrote at that time.

In the case of *Gale et al v. Union Bag & Paper Company.* the court, while holding that certain bargetenders were seamen and therefore exempt, emphasized the fact that those bargetenders performed only services which related to the welfare, operation and safety of the barges which were operated on navigable waters as means of transportation in commerce, General Fleming pointed out.

Therefore the decision is not regarded as controlling in the case of workers on barges who perform other duties, for example, workers who, because of their loading and unloading functions, are correctly to be regarded as stevedores. In such cases the exemption is not deemed applicable.

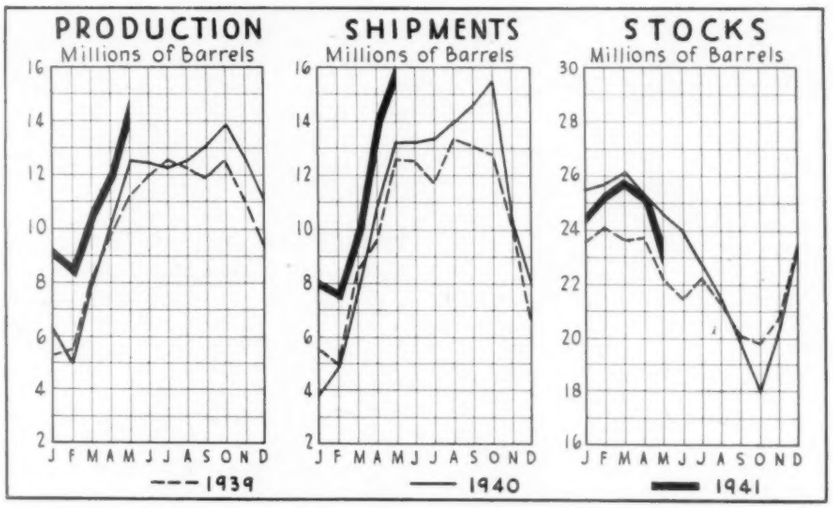
Because the decision in this case indicates that to be exempt as a seaman, the work of the employee in question must be directed to the navigation of a vessel as a means of transportation upon navigable waters, it is also regarded as implying that employees on dredges whose duties relate to the operation of the dredging mechanism are not properly to be considered seamen.

The decision in this case indicates that the decision taken by General Fleming with respect to the dredging employees of the Smoot Sand & Gravel Company on July 12, 1940, was probably erroneous. Therefore the Administrator on reconsideration no longer feels that his previous administrative decision was correct and has announced its abandonment.

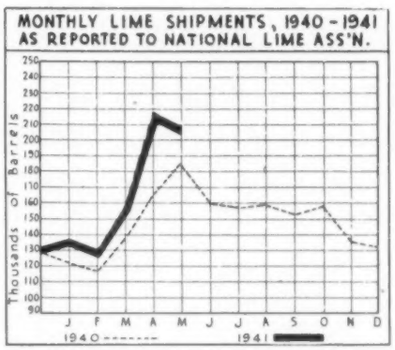
On October 9, 1940, the division had announced that the Administrator's letter of the previous July 12 applied only to the particular circumstances of the operations of the Smoot Sand & Gravel Company. Employers of dredging employees who are engaged in interstate commerce or in the production of goods for interstate commerce are advised to comply with the provisions of the act as to such employees.

Ohio River sand producers held a preliminary conference on the subject of seamen's exemption at Evansville, Indiana on June 26, at which time V. P. Ahearn, executive secretary of the National Sand & Gravel Association read a letter received from Baird Snyder, deputy administrator of the Wage and Hour Division. Mr. Snyder expressed the willingness of the division to "undertake negotiations with the industry leading to compliance, assuming that the exemptions will not be given." "Furthermore," the deputy administrator wrote, "the agreement would be made without prejudice of further examination into the seamen's exemption, the industry to be given the benefit of such exemption from the date of any new determination on. Such negotiations would be undertaken with the idea of obtaining *future* compliance."

The producers who attended the Evansville meeting agreed that a conference of all interested producers should be held as soon as possible at Washington and that Administrator General Philip B. Fleming and Mr. Snyder should be invited to attend. By agreement with Mr. Snyder it was arranged that such a conference would be held at the Willard Hotel on July 23.



The Portland-cement industry in May, 1941, produced 14,732,000 barrels, shipped 16,048,000 barrels from the mills, and had in stock at the end of the month 22,740,000 barrels af cement, according to the Bureau of Mines. Production and shipments of Portland cement in May, 1941, showed increases of 16.6 and 21.5 per cent., respectively, as compared with May, 1940. Portland cement stocks at mills were 8.2 per cent. lower than a year ago.



According to data collected by the National Lime Association, 70 companies in May, 1941, shipped 209,449 tons of lime (123,000 quicklime; 86,449 hydrate). Reporting companies represent 51.4 per cent. of the association's total capacity of record. Based on PIT AND QUARRY'S estimates for the remainder of the industry the total shipments for the month are estimated to have been approximately 405,000 tons. Shipments of lime by use and grade for May, 1941, were:

Use	Quicklime (tons)	Hydrate (tons)
Agricultural	3,227	18,853
Building	23,257	39,382
Chemical	96,516	28,214
Total	123,000	86,449

Crushed-Stone-Plant Accident-Severity Rate Reduced 15%

A 15-per cent. reduction in the accident-severity rate at crushed-stone plants was revealed by reports from companies that participated in the safety contest of 1940 conducted by the Bureau of Mines in coöperation with the National Crushed Stone Association.

The contest was the fifteenth yearly safety competition conducted by the Bureau of Mines for the promotion of safety in the crushed-stone industry. Forty-six open quarries and 4 underground mines, all members of the National Crushed Stone Association, were enrolled. The winner of the 1940 award was the Blairs granite quarry, Blairs, South Carolina, operated by the South Carolina Granite Company, a division of the Southern Aggregates Corporation, which worked 142,386 man-hours without a disabling injury. Eighteen other plants that operated throughout the contest year without a lost-time injury were awarded honorable mention.

Blast Death Ends Long Quarry-Safety Record

A quarry-safety record of nine consecutive years was broken when Louis Kraust, 41, crusher foreman in the quarry of the Marquette Cement Manufacturing Company at Cape Girardeau was fatally injured recently. Mr. Kraust was struck in the back by a flying rock during a blast.

$125,000,000 for Access Roads Sought by F. D. R.

President Roosevelt in a recent message to Congress asked for $125,000.000 for immediate defense highway improvements. The recommendation called for $100,000,000 for military access roads and $25,000,000 to strengthen bridges and widen highways on the strategic military system of 75,000 miles in "key areas."

This request was disappointing to those who have made a careful study of the situation, V. P. Ahearn of the National Sand & Gravel Association points out. It contrasts with estimates of the Public Roads Administration, calling for $287,000,000 for defense roads and drastically increased on May 15 to $808,000,000. A House bill (H.R. 5110) authorizing the original amount of $287,000,000 has, however, gained committee approval and a special rule is being sought to expedite action.

The early estimate was divided into $150,000,000 for access roads; $25,000,000 for tactical roads; $100,000,000 for the strategic system, and $12,000,000 for future planning of the strategic highway system. The later figures called for $458,000,000 to be spent immediately in strengthening the strategic network and $350,000,000 for construction of access roads.

Smidth Employees Tour National Cement Plant

A group of 110 employees of F. L. Smidth & Company, New York, was conducted on a tour of the National Portland Cement Company's plant at Brodhead, Pennsylvania by Fred B. Franks, vice-president and general manager of the cement company a few weeks ago.

The Smidth company furnished much of the equipment for the plant when it was built a few years ago. A luncheon was served at the plant. The trip was made by special train and bus.

Honolulu Firm Making Volcanic-Ash Bricks

A "sand-lime" brick made from hydrated lime and volcanic cinders is being produced on a large scale in Hawaii by the Honolulu Brick Company. It has gained considerable favor as a building material under its trade-name "Cind-R-Brik."

The company is a subsidiary of Hawaiian Gas Products, Ltd., Honolulu lime producer.

The Dixie Lime Rock Company of Ocala, Florida, uses a Caterpillar tractor to do triple duty in its quarry. The overburden is removed by a 11-cubic yard LeTourneau Carryall scraper, a LeTourneau Rooter then breaks up the relatively-soft rock. A bulldozer is then used ahead of the tractor to push the rock into piles for loading.

90 Pits, Quarries Granted Operating Loans by R.F.C.

According to the report of the Reconstruction Finance Corporation for the third quarter of 1940, two loans aggregating $320 000 were authorized for mining, milling, or smelting of ores in the third quarter of 1940. The report includes totals of loans made for the period from the organization of the corporation on February 2, 1932, to September 30, 1940, inclusive.

A total of $25,300,000 had been authorized for loans to 221 business enterprises in mining and quarrying from February 2, 1932, to September 30, 1940, inclusive, exclusive of the mining loans authorized under Section 14 of the act approved June 19, 1934, as amended. The amount disbursed was $13,000,000. Broken down into industries, the amounts were as follows: Loans to 96 coal companies authorized $16,850,000, of which about $8,093.000 had been disbursed; 56 loans to stone quarries, $4,725,000 authorized and about $2,630,000 disbursed; 34 loans to sand-and-gravel operations, $1,348,000 authorized and more than $966,000 disbursed; and 35 loans to miscellaneous mining, nearly $2,380,000 authorized and more than $1,356,000 disbursed.

Under Section 14, mentioned above as excepted, loans authorized to borrowers engaged in mining, milling, or smelting of ores totaled 164 to 133 borrowers. They were classified by states according to the location of the property of the borrowers, and included 17 states and Alaska; the states were all in the West and South, with the exception of Michigan. Under this section the total amount authorized was $15,493,000, of which $8,382,000 has been withdrawn or canceled and more than $6 245,000 disbursed, leaving about $3,582,000 outstanding as of September 30, 1940. Repayments and other reductions, exclusive of repayments unallocated pending advice, as of September 30, 1940, aggregated nearly $2,664,000.

Gypsum Operator Will Sink Exploratory Shaft

The Cayuga Gypsum Company, Cayuga, Ontario, is preparing to sink a shaft to explore a white-gypsum vein found at a depth of approximately 80 feet.

The Windom Sand & Gravel Company has been established near Windom, Minnesota, by James Thompson, E. J. Granum and Harlow Ostebo.

CURRENT BUSINESS INDICATORS

Steeply rising prices and growing shortages of basic raw materials have been the dominating business influences in recent weeks. These developments have made it increasingly evident that many branches of industry are going to be hurt severely in the near future as a result of the gathering momentum of the defense program. Indeed, in a number of industries production has already been slowed down to almost a standstill and Washington is being flooded with letters of protest. Although both the OPM and the OPACS recognize the seriousness of the problem that faces the non-defense producers, little real relief is in sight.

Notwithstanding the difficulties that have been experienced by non-defense industries in recent weeks, business in general registered another impressive advance in June. Preliminary estimates place the Federal Reserve Board's index of production in manufacturing and mining at 156 per cent. of the 1935-39 average, an 8-point gain over the preceding month. This increase has brought the index to a level that a large number of industrial economists a few months ago considered unattainable. How much farther the impetus of the defense effort will carry the index is a matter of speculation. As yet, however, there is little convincing evidence to suggest that the upper limits are being approached.

One of the important factors contributing to the June advance was the impressive production record of the steel industry. Throughout the month all segments of this important industry were pressing hard against the outside limits of what was practicably attainable. Steel-ingot production, for example, ended the month with an average of slightly better than 99 per cent. of capacity. Rolling mills also operated at high speed throughout the month. In spite of the record-breaking levels that were reached during the month, the demand continued to outrun the supply and a general preference order has been applied to the industry.

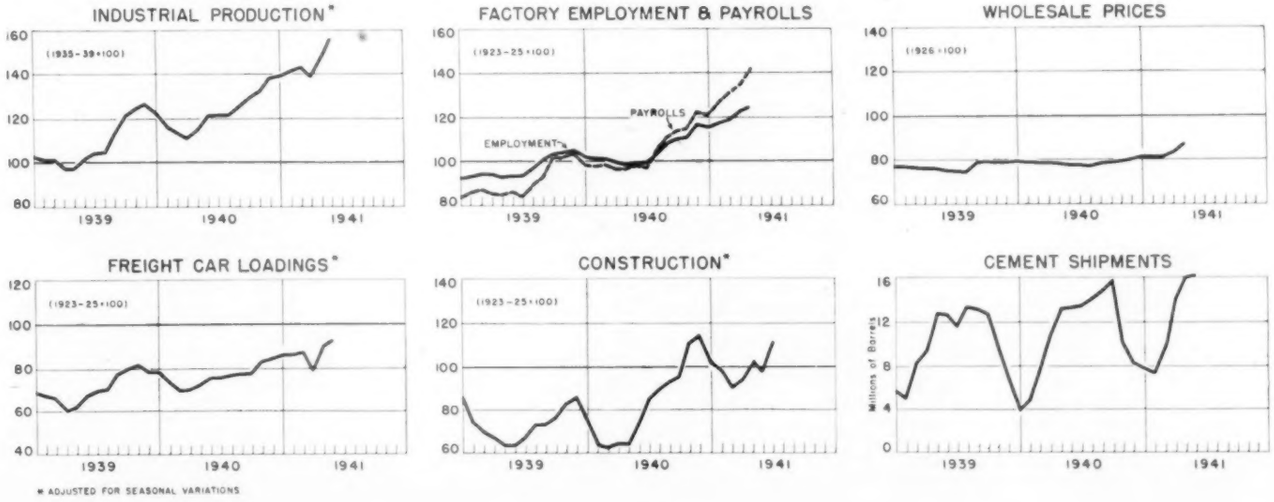
Another factor that contributed heavily to the upturn was construction. On a seasonally-adjusted basis the index of construction contracts for June shows an increase of about 15 per cent. over the previous month. Moreover, the F. W. Dodge Corporation reports that construction activity may be expected to continue at high levels for the next year as industrial-plant expansion continues at a spectacular rate. Non-defense construction, however, is virtually certain to fall off abruptly in the near future as a result of priority rulings and shortages of a wide variety of essential building materials.

With the construction industry operating at a rate that has not been attained for more than a decade, cement shipments continue to advance. In June the Bureau of Mines reports that Portland-cement shipments amounted to 16,109,000 barrels, as against 16,048,000 barrels in May. Compared with the corresponding month of last year, this represents an increase of somewhat more than a fifth.

Freight-car loadings also increased substantially during the month. Against an index of 91 for May, the seasonally-adjusted index for June was 94, approximately a fourth higher than in June of last year and nearly two-fifths above that for the corresponding month of 1939. Moreover, during the week ending June 28 car loadings topped the 900,000 mark for the first time since 1930.

Meanwhile the trend of prices continues to command attention, particularly that of Leon Henderson and the OPACS. In June, as in the month preceding, wholesale prices advanced on a broad front. From 84.9 per cent. of the 1926 average in May, the Bureau of Labor Statistics' index of wholesale commodity prices rose to 87.1 in June, an advance of about 3 per cent. Although the present price level is still only slightly above that at the outbreak of the European war, the OPACS is inclined to regard the present behavior of prices as paralleling closely the course followed by wholesale prices during the early stages of World War I. As a result some form of mandatory price control seems to be definitely in the offing. A few days ago legislation designed to control the cost of the defense program and prevent a ruinous spiral of prices was placed on the agenda for this session of the Congress. As yet, however, nothing definite has been decided upon.

Although what happens in the way of price control has by far the most significant implications, interest in Washington at present is focused upon the reorganization that is taking place within the OPM. On June 24 the establishment of industry advisory committees and commodity sections to expedite the defense program was announced. Under this plan each major industry will deal with a single division of the OPM through commodity sections instead of having to go in turn to the Priorities, Production, and Purchases Divisions. The plan makes sense on paper, but how it will work out in practice remains to be seen.



EDITORIAL

Defense for War—VII

DURING and after World War I many thoughtful and generously-intentioned persons throughout the world believed that the German people should be absolved of all responsibility for an international catastrophe that had reached new levels in the destruction of human life and of the products of human ingenuity and labor. These kindly-disposed persons struggled between the opinions fostered by Allied propaganda on the one hand and their good opinion of individual Germans of their acquaintance on the other hand. The stories of the atrocities alleged to have been committed on defenceless women and children in Belgium seemed incredible when one thought of the kind and courteous hospitality for which the Germans had become noted. It was difficult to believe that a nation that had given the world so much pleasure through its music could give it, too, so much terror and tragedy through its political ambitions. Following the Treaty of Versailles there was a definite tendency toward sympathy for the German side; through the harshness of some of its provisions the German nation was made to appear as a sort of much-abused and relentlessly-persecuted people from whom the last ounce of strength and the last penny of tribute was to be exacted.

In World War II world sentiment seems unlikely to follow the pattern of the public opinion born of World War I. The former struggle struck the world with cataclysmic suddenness; there was little time for the formation of fair or reasonable judgments. The swiftness of the attack, the superiority of one side in the state of its preparation for war, the violation of treaty obligations; these and other factors pointed the accusing finger at one of the participants. To thoughtful minds the rapidity with which these judgments were formed was a warning of the dangers that lay in their broad and uniform claims; there followed that sobering and softening of opinion that was the necessary antidote to the poison of propaganda-inspired hatred that had affected so many people.

In World War II a vast difference in the historical background has brought a vast difference in the attitudes of many people to the question of war guilt. A series of conquests coming in a more or less measured sequence, each one seeming to have no justification except the excuse that "might makes right," the fact that in each case a small and weaker nation was bullied and its territory overrun by a large and more powerful one, coupled with the fact that the conqueror had spent years in preparing vastly superior armaments and in organizing a world-wide system of espionage and revolutionary intrigue; these successive events and revelations have built up in the minds of the same type of "thoughtful and generously-intentioned persons" the conviction that this time there can be no mistake in the assessment of guilt, that this time not only the German government, but also to a large—and possibly even the same—extent the German people, stand convicted in the judgment of the rest of the world. The conviction is not the result of snap judgment, but of a detached and reasoned evaluation of current history, whose record of events during the last few years seems to them to prove beyond the shadow of a doubt that the German government—and behind it the German people—is bent on the destruction of all other governments, on the abolition of the liberties and privileges for which other people have fought and died, and on the imposition on those other peoples of a system of tyranny, exploitation and individual degradation without a parallel in the history of civilization. This time, say these persons, the German people can not escape the burden of responsibility for a situation that they could have prevented had they wished to do so; they can not exhibit such blind adulation of a leader without sharing in the terrifying evil that he does as well as in the incomparably small good that he achieves. This time the German people are looked upon as one and the same as the German government, despite the fact that the present government of Germany does not rule by the consent of the governed and has not been given specific authority for its multiplied aggressions.

The theory of a "Nation in Arms," evolved by the Germans in the 19th century, has become the theory of a "Nation at War." *Deutschland über Alles* has changed, too, from the patriotic, self-effacing attitude of the average German, whose willingness to sacrifice everything for Germany evinced his desire to place Germany ahead of all personal considerations —"Germany above all"—to the broader concept, to the strutting, self-confident battle cry of a nation on the march in a campaign for world domination—"Germany over everything." When Ebert, president of the German Reich in 1919, proceeded to declare the national anthem to be *Deutschland über Alles,* he provided a symbol for the insanely-ambitious world-domination psychosis which to-day animates not only the German nations's leader, but its people as well. From a fatherland fixation the German mind has been turned to a German-dominated-world fixation; from a desire to make their nation respected they have turned to a determination to make it feared and its people hated and despised. That psychological triumph—psychiatrists would give it another name—is felt to be Hitler's greatest claim to greatness.

Because of their political background as a recently-fused union of previously separate and sometimes hostile states and not because of any inherited racial trait, the German people appear to suffer from a sense of inferiority. They view themselves as a persecuted people, whom the other nations of Europe have sought to encircle with an economic ring of steel, whose political—that is to say, world-power—ambitions have been thwarted by France and England, whose claims to cultural and racial superiority have not been properly recognized. Ridden by a persecution complex of national proportions, they must find a national scapegoat, they must boast, bluster, fight, torture and conquer to prove to themselves that they are not only equal, but, in fact, superior, to the peoples of other nations. Into such a pattern of national self-abasement and fanatical aggressiveness Hitler fitted perfectly. Ambitious only to be frustrated, vain only to be humbled, he is perfectly attuned to the psychology of present-day Germans. It becomes difficult, therefore, to hold him exclusively responsible for the havoc he has wrought in the world. It becomes difficult, too, to absolve the German people from joint responsibility for the depredation done by them at his command.

IT will take a long time to make the German people aware of their social responsibilities in a world sense. It will take a long time to overcome their childish willingness to leave their political future in the hands of leaders who lead astray more often than forward. It will take a long time to make them realize that the period of their greatest prosperity was the period of their greatest individual liberty, that the short six years of the Republic were the only ones in the last thirty in which Germans were normally fed. It will take a long time to undo the mischief wrought by Frederick the Great, Bismarck, Wilhelm II and Adolf Hitler, to allay the fears that, by virtue of constant repetition, continue to harass Germans everywhere, and to direct into socially and internationally wholesome channels the furious enthusiasm that is now devoted to destructive ends.

Aluminum Production by Dam Power.—Grand Coulee Dam in Washington and Boulder Dam in Nevada will furnish electric power for the defense production of more than one-third of the 600,000.000 pounds of additional aluminum production planned by the OPM beginning in 1942.

Labor Discrimination. — President Roosevelt has directed that a Committee on Fair Employment Practice be set up in the OPM to prevent "discrimination in the employment of workers in defense industries or government because of race, creed, color, or national origin." Government contracts will forbid contractors to discriminate for such reasons.

Locomotives.—In an effort to relieve the shortage of all types of locomotives the Civilian Supply Allocation Division of the OPACS on July 7 issued an allocation program giving preferential-delivery status to equipment and materials essential to their construction. Additional industrial, mine and railroad locomotives are urgently needed. Railroad cars and buses for urban and interurban service have been given the same status.

Minerals Chairman Resigns. — Dr. Ernest M. Hopkins, chairman of the Minerals and Metals group, Priorities Division, OPM, has resigned to return to his duties as president of Darthmouth College.

Plant-Expansion Certificates. — The National Defense Advisory Commission (NDAC) has issued the following certificates of necessity for plant expansion to nonmetallic-mineral producers since June 1:

Basalt Rock Company, Napa, California.—Fuel barges $212,000.

Transit Mixed Concrete Corporation, Norfolk, Virginia,—Concrete $16,000.

Price Control.—The OPACS has issued price schedules on 11 materials: combed cotton yarn, cotton gray goods, domestic hides, rip and calf skins, iron and steel products, pig iron, scrap and secondary aluminum, scrap iron and steel, scrap and secondary slab zinc, secondary materials containing nickel, and second-hand machine tools.

Price Raising.—Administrator Leon Henderson, Office of Price Administration and Civilian Supply (OPACS), has enumerated five subterfuges and devices which some industries, such as the scrap and secondary aluminum and zinc trades, are employing to evade price ceilings:

(1) Falsification of records or failure to record all transactions, with the object of completing sales at prices above the established maxima.

(2) Designation of the dealer as an "agent" or "employee" of the buyer, entitled as such to a "commission" or "salary" which brings the realized price above the ceiling. "Bonuses," "premiums," or "service charges" for locating, cleaning or classifying material.

(3) Unwarranted freight charges arrived at by computing haulage from some point other than the dealer's yard or actual and final place of shipment to the buyer.

(4) Sale of dirty or contaminated material at the maximum prices established for clean and dry scrap.

(5) Sale at maximum prices of admixtures of metals, for which ceiling prices have been established, and cheaper materials.

Priorities.—Summarizing a half-year's activities of the OPM, Priorities Director E. R. Stettinius, Jr., said recently that 14 materials were then under industry-wide control, 15 were under inventory control, and others were under minor restrictions. Those under industry-wide control June 30 were: aluminum, borax, copper, cork, ferrotungsten, machine tools, magnesium, nickel, nickel-steel, polyvinyl chloride, rubber, tungsten high-speed steel, synthetic rubber, and zinc. Those under inventory control were: antimony, cadmium, chromium, ferrous alloys, iridium, iron and steel products, lead, manganese or spiegeleisen, mercury, molybdenum, non-ferrous alloys, tin, vanadium, and secondary materials or scrap of the metals listed.

Priorities Critical List.—A revised Priorities Critical List was issued July 14 by the Priorities Division, O.P.M. It contains over 300 items and classes of items on deliveries of which Army and Navy contracting officers may assign preference ratings. Except for certain specified items which are subject to industry-wide control by the Priorities Division most of the items listed are subject to priority control only in the sense that Army and Navy orders for these items may automatically be assigned preference ratings. Items of interest to nonmetallic-minerals producers include:

Angledozers and bulldozers (tractor-drawn); bearings (ball and roller); blasting machines; boilers (power-plant); borax; compressors (air); Diesel engines (all types); explosives; fuel (aviation, Diesel, 50-cetene number and up); generators (electrical); hoists (power or hand); iron and steel products (rolled, drawn, forgings, castings and pig iron including alloy steels); insulating and fire brick; lighters and barges; locomotives (Diesel, gasoline, electric); lubricants (Diesel-engine, special "RPM — Delo" or equivalent); motor trucks; scrapers (tractor-drawn); steel; switchboards (power, complete assembly); thermometers (industrial); trailers (2-, 4- and 6-wheel); transformers (electrical); welding rod.

Priorities Information.—Six new field offices of the Priorities Division, OPM, have been opened to advise business men on the operation of priorities. Each office may be reached through the Federal Reserve Bank in its city. The new offices are:

California.—Andrew L. Kerr, district manager (San Francisco).

Colorado.—V. L. Board, district manager (Denver).

Georgia.—John B. Reeves, district manager (Atlanta).

Michigan.—Walter Hall, district manager (Detroit).

Missouri.—Louis E. Crandall, district manager (St. Louis).

Ohio.—W. Thomas Walker, district manager (Cleveland); Bruce W. Burroughs, district manager (Union Trust Building, Cincinnati).

Pennsylvania.—Charles F. Cruciger, district manager (Pittsburgh).

Texas.—J. Burke Crockett, district manager (Dallas).

Repair and Maintenance Priorities.—Twenty-six industries have been given priority status for repair and maintenance materials and equipment required for uninterrupted operation by an allocation program covering such items issued July 1 by the Civilian Supply Allocation Division of the OPACS. The 26 industries affected include mining and quarrying; highway maintenance; commercial operation of motor trucks; shipping (including ocean, lake, river and canal commerce); railroads; production of chemicals; etc.

Repair Parts.—The Civilian Supply Allocation Division of the OPACS promulgated on July 12 an allocation program giving repair and maintenance parts for privately-owned trucks, tractors, trailers, automobiles, oil burners and automatic stokers a preference over other civilian needs.

Scientific Research.—By Executive Order on June 28 President Roosevelt created the Office of Scientific Research and Development (OSRD) of which Dr. Vannevar Bush has been appointed director. Its purpose is to advise the President on the status of scientific and medical research relating to national defense, to mobilize the scientific personnel and resources of the nation for defense purposes, to coördinate the re-

search activities of the Army and Navy and other Federal Government agencies, to initiate and support scientific research on the mechanisms and devices of warfare in order to create and develop the instrumentalities, methods and materials required for national defense, etc.

Tire Prices.—The setting of ceiling prices on finished rubber products—tires and tubes in particular—will be deferred for some months, OPACS Administrator Henderson announced July 3. There is little or no prospect that these prices will get out of hand, in spite of contemplated reductions in crude-rubber consumption, in the opinion of tire makers. For competitive reasons prices have recently been at low levels. The OPACS had previously announced that a ceiling would be placed on tire and tube prices at June 16 levels.

Trucks and Passenger Cars.—Effective August 1, motor-car and passenger-car production will be reduced by 20 per cent., as announced by the OPM on April 17. Curtailment to 50 per cent. has been tentatively suggested to become effective November 1, and further restrictions, if necessary, will be determined by the Automotive Defense Industry Advisory Committee (ADIAC) formed July 2 and consisting of 19 members—representatives of 11 vehicle manufacturers and 8 parts and accessory manufacturers. A Labor Advisory Committee composed of members of automotive labor organizations, is planned, according to Associate Director General Hillman.

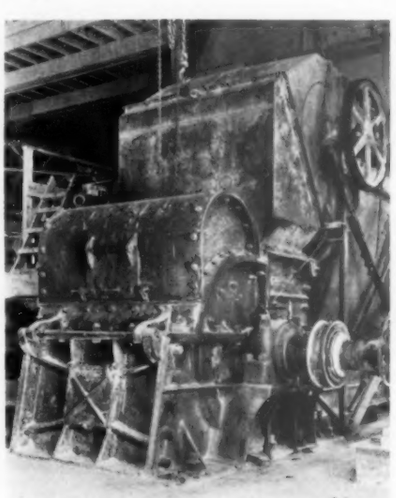
James S. Adams, executive vice-president and director, Colgate-Palmolive Peet Company, is now chief of the new automotive industry section of the OPM, according to John D. Biggers, director of production.

Truck Transportation.—Ralph Budd, Transportation Commissioner, Office for Emergency Management (OEM), has formed a 9-member Central Motor Truck Transportation Committee with 16 regional committees to advise on motor-truck transportation problems. John Rogers, Interstate Commerce Commissioner is chairman of the central committee; H. H. Kelley, safety chief of the Bureau of Motor Carriers of the Interstate Commerce Commission, is executive secretary. Other members already appointed are: Thomas H. MacDonald, commissioner, Public Roads Administration; Ted V. Rodgers, consultant on Organized Trucking, Transportation Division, OPM; and Frederick C. Horner, consultant on Private Trucking, Transportation Division. Six other members representing the Office of Civilian Defense (OCD), the National Grange, the for-hire truck operators (2), and the private truck operators (2) will be named.

The central committee will formulate and execute plans for "the efficient and economical use of highways and motor vehicles in the transportation of property." It will coöperate with government agencies and those furnishing or using transportation facilities in promoting the national defense and "to assure sufficiency of motor-truck equipment to meet the needs of national security."

The 16 regional committees will have headquarters in the field director's offices of the Motor Carrier Division of the ICC, the following field directors serving as chairmen:

Arkansas.—Roy A. Atherton (Little Rock).
California.—Richard T. Eddy (San Francisco).
Colorado.—Dan F. Harris, Jr. (Denver).
Georgia.—William Addams (Atlanta).
Illinois.—Frank Purse (Chicago).
Massachusetts.—George R. Nuzum (Boston).
Minnesota.—William R. Hustleby (Minneapolis).
Missouri.—James F. Miller (Kansas City).
New York.—R. K. Hagerty (New York).
North Carolina.—T. J. Reynolds (Charlotte).
Ohio.—Roy N. Snetzer (Columbus).
Oregon.—Frank Landsburg (Portland).
Pennsylvania.—H. R. Stickel (Philadelphia).
Tennessee.—Ward Faulkner (Nashville).
Texas.—T. L. Childs (Forth Worth).
Utah.—Bert L. Penn (Salt Lake City).



After having used two Gruendler all-steel swing-hammer crushers in its La Salle, Illinois plant for two years, the Marquette Cement Manufacturing Company has installed a third machine of that type in its Hawkeye plant at Des Moines, Iowa. The new crusher has a capacity of 300 tons per hour and will increase the output of the Compeb mills.

Marquette Improves Plant at Des Moines

The Marquette Cement Manufacturing Company has work underway on a major addition to the old Hawkeye plant at Des Moines which it acquired some months ago.

A new raw-material storage building is being erected and a structure to house a new kiln will be built shortly. The kiln, being fabricated by the Allis-Chalmers Manufacturing Company, will be 11½ feet in diameter and 475 feet long. Some new raw-grinding facilities will be placed in service while the old finish-grinding mill will continue in service grinding the clinker from the new kiln.

The old plant is being rehabilitated and some new equipment is replacing the old. Recently a new Gruendler hammer-mill was installed.

The construction work is being done by Arthur H. Neuman & Brothers of Des Moines.

Slag-Plant Employees End 8-Week Strike

An eight-week strike at the Woodstock Slag Company, Birmingham, came to an end on June 16. M. C. Hughes, state labor conciliator, announced that a contract had been signed by the company and members of Local 2255, Steel Workers Organizing Committee, a C.I.O. affiliate.

Workers receive a wage adjustment under the contract, but their original demand for a closed shop and the check-off system was not granted, Mr. Hughes said. More than 50 men were involved in the strike.

Officials of the company, which had been idle since the strike, said that its plant had been working on defense contracts—slag for airport runways.

Soil-Cement Highways Continue to Increase

Progress in the use of soil-cement roads is revealed in a recent report of the Portland Cement Association which reveals that, up to January 1 of this year, 240 projects have been built or awarded in 35 states and Alaska.

The total mileage involved is 584, or 7,831,804 square yards.

Seeks Bids on Cement for New Canal Locks

Bids will be opened at Washington, D.C. on August 5 on 6,000,000 barrels of cement to be used in the construction of the third set of locks at the Panama Canal.

Both east- and west-coast plants are reported to be submitting bids.

The plant viewed from the dredge pond. Sand classifiers are at left, barge-loading system at extreme right.

Seminole's New Rock and Sand Plant Declared One of Finest in South

ONE of the things for which Florida is noted is the original way in which things are done and this is especially true of the Miami area. This can be said even of the aggregates deposits, which are unlike anything else in this country, consisting of various combinations of hard and soft rock and sand. It is not strange, therefore, that production methods and plants in this area are also unlike any found elsewhere. The latest and most interesting of these plants is that of the Seminole Rock & Sand Company at 14th Street and North West Red Road near the outskirts of Miami. This plant is a combination rock and sand plant which combines the production methods common in this area with some of the advanced methods developed in other sections.

This deposit was opened in 1928 by the Seminole Fruit & Land Company, which owned considerable property in this area. Operations were not very successful and the Atlas Rock Company, formed later by the same interests, produced no better results. In 1933 the present company was formed and purchased the original plant and property. Practical operating methods were applied and the present plant is a monument to their success. Improvements were made to the old plant from time to time, one of the most important being the installation of vibrating screens in 1934 to replace rotary screens. At that time the plant produced about 110 cubic yards of sand and rock per hour.

Drag-lines and trucks were used to feed material to the plant until late in 1937, when the present 12-inch suction dredge was installed and a pond was developed off the Tamiami Canal. This immediately increased production and made available the coarse sand which it was impossible to recover with the former methods.

For some years a new plant had been contemplated to provide more economical operation and because the deposit was getting too far away from the old plant. The construction of this plant was begun late in 1939 and the dredge was moved to the new location in March, 1940. While the new plant was being built the dredged material was pumped into a dewatering sump and hauled in trucks to the old plant, which has since been dismantled. The new plant went into operation in August, 1940.

This deposit is said to be the only one of its kind in Florida. It consists of a 4- to 5-foot surface layer of solid but comparatively soft limestone similar to marble in its crystalline structure. Below this is 6 to 8 feet of a porous but hard lime-rock and a 4-foot layer of solid rock. Under this layer is almost pure silica sand extending to varying depths and under this in places is found coquina, or shell rock, in which there is considerable coarse sand. Many fossils are found in the coquina, including sea-animal vertebrae up to 12 inches in diameter, shark teeth, clams, etc.

The overburden of up to 3 feet and about 4 feet of the rock are above water-level and these are removed separately with a scraper so that the dredge does not need to undercut the bank. A Caterpillar RD8 tractor first breaks up the rock to a depth of 4 inches with a heavy multi-toothed plow. This material is then piled in windrows with a bull-dozer. This process is repeated down to water-level. Later a 12-cubic yard La Plante-Choate Carrimor scraper picks up this material and hauls it to the plant to be processed or to be used as road-base material.

Some years ago most of this material was broken up by blasting but ordinances prohibiting this in built-up areas have since been passed. Later ditching machines were tried without much success. The present system has proved to be by far the most satisfactory of any tried. With this method about 1,000 tons of road-base material under 4 inches in size can be produced in 10 hours.

The dredge has a steel hull. All the equipment on it is driven from a 4-cylinder, 225-horsepower Anderson Diesel engine. The deposit is broken up by a 50-foot ladder with a 25-tooth revolving cutter-head which is supported from an A-frame. Two walking spuds are used to anchor or move the dredge. In operation the dredge is anchored on one spud while the other moves the

The 12-inch pump on the dredge. At right is the hoist that operates A-frame.

cutter end of the dredge in a semi-circle. The process is then reversed. The dredge moves into the deposit from 1½ to 2 feet at each step.

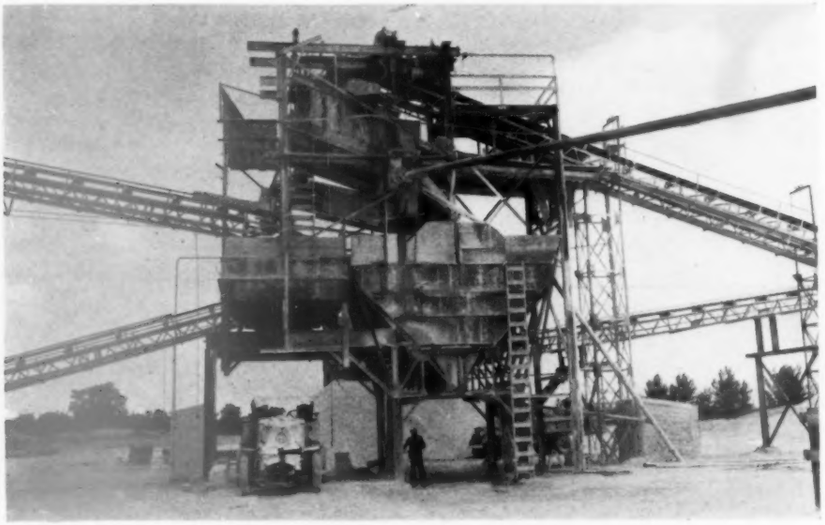
The 12-inch Morris centrifugal dredge pump is driven from the engine through a flat belt. At present it is pumping a distance of about 700 feet to the plant, but it has been used efficiently up to 1,200 feet with a considerable vertical head at the plant. The pipe used is purchased new and is in 30-foot sections with a 12-inch interior diameter and ¼-inch walls. By turning the pipe occasionally even wear is obtained all around. All the pipe sections, whether on pontoons or on the ground, are connected with flexible rubber couplings.

The stream from the plant end of the pipe-line is discharged tangentially into a 4-foot-diameter vertical cylindrical hopper, which breaks the force of the flow. This hopper has a flared top to allow loading from the outside. During the night, and at other times when the plant is not in operation, the dredged material is discharged from the pipe-line into a circular filled sump on the bank near the hopper. The material brought in by the scraper is also piled here. While the plant and dredge are operating a Bucyrus-Erie 22-B drag-line with a Caterpillar Diesel engine and a ¾-cubic yard bucket feeds this material into the hopper.

The dredge produces an average of 125 cubic yards of material per hour. The plant capacity exceeds this considerably and, with the several feeds described above, has produced over 180 cubic yards per hour with an average of about 150.

The water and material are discharged from the hopper into a 5- by 24-foot revolving screen which has an 8- by 15-foot outer jacket. This screen makes the original separation of the coarse rock, medium and small rock, and sand. Its main barrel is equipped with 1-, 1½- and 2½-inch openings and the jacket has 3/16- by 1¼-inch slots. All the rock over 2½ inches in size is discharged on a 24-inch by 110-foot inclined belt-conveyor running to a surge stock-pile, which has a live-storage capacity of 250 cubic yards of material reclaimable through a tunnel under it. The tractor and bulldozer are used to move dead-stored material over the tunnel. In this way the actual storage capacity is about 2,500 cubic yards. This material is reclaimed on a 30-inch by 90-foot belt-conveyor which feeds it into a 30- by 48-inch McLanahan & Stone single-roll crusher. The product of the crusher is carried on a 30-inch by 18-foot belt-conveyor to the 30-inch by 150-foot main belt-conveyor running to the screening tower.

Dredge pipe-line with hopper ahead of the revolving screen. The ¾-cubic yard drag-line and Diesel tractor both feed the same hopper shown in background.



The screening building with feed and stock-piling conveyors above, right and left. The reclaiming conveyor at lower left loads ballast into cars or on conveyor (lower right) for recrushing.

The 3/16- to 2½-inch rock passing through the main barrel and retained on the jacket of the revolving screen also goes on the main conveyor.

The rock is discharged from this conveyor on a pair of 3-deck vibrating screens, one a 4- by 12-foot Simplicity Type D, the other an Allis-Chalmers 4- by 10-foot Style B. Both screens usually have ⅞-inch, ½-inch and ¼- or 3/16 inch openings on their three decks. All the ⅞- to 2½-inch rock passing over the top decks of these screens is carried on a 24-inch by 100-foot belt-conveyor to a stock-pile, which also acts as a surge pile for feeding the reduction crusher. It has a capacity of about 5,000 cubic yards, of which

The two 8-ft. cone classifiers used for sizing sand. Sand-drag is visible at right.

about 1,500 cubic yards is live storage from which material is reclaimable through a 140-foot tunnel under the pile. This tunnel has 8 gates through which the rock is fed on a 24-inch by 180-foot belt-conveyor. From the conveyor the rock can be discharged into hopper cars as finished railway ballast, of which over 100,000 tons is sold annually.

For further reduction this rock can be discharged on a 24-inch by 117-foot belt-conveyor which feeds the Nordberg Symons 46-inch impact crusher. This machine is operated at a speed of 1,000 r.p.m. for the best results in both capacity and fineness. Because of the abrasiveness of the rock it is necessary to reface the impact faces of the crusher at frequent intervals. P&H Hartung tungsten-bearing alloy is used as it has been found to have the necessary ductility and wear resistance together with a low coëfficient of expansion. A short belt-conveyor feeds the product of this crusher back on the main belt-conveyor supplying the two vibrating screens.

The ¾-inch rock retained on the middle decks of these screens, and the minus-½-inch rock retained on their bottom decks can be discharged into separate 20-cubic yard steel bins for truck-loading. Ballast off the top deck can be loaded direct into cars through a third bin.

There is also a series of three 24-inch belt-conveyors for stock-piling the ¾- and ½-inch products from these bins for barge loading. The first belt-conveyor is 78 feet long and can discharge the ½-inch rock on a stock-pile or either material on the second 48-foot belt-conveyor. From this conveyor the ¾-inch rock is discharged on a stock-pile or either material on the final 38-foot conveyor. From this conveyor these materials are discharged into two compartments of a 250-cubic yard truck-loading bin.

The ½-inch material stock-pile has a live-storage capacity of 150 cubic yards and the ¾-inch stock-pile of 500 cubic

The 4- by 10-foot, 3-deck vibrating screen used for final sizing of stone.

The 4- by 12-foot, 3-deck screen also used for final sizing of stone.

View from the screening building, showing the dredge pipe in the background, the drag-line, hopper and revolving screen, and some of the conveyors.

yards. The material in either pile can be reclaimed through a tunnel extending under both piles. Three gates under each pile allow the discharge of separate sizes or any desired blend of the two on a 24-inch by 135-foot belt-conveyor. This conveyor extends over the water and is inclined at its discharge end for barge-loading. From 300 to 500 cubic yards of rock is loaded into barges daily for delivery in the Miami area.

The sand passing through the jacket of the revolving screen goes through a flume to the center of a concrete-walled settling basin 30 feet in diameter and 8 feet deep. A 6-inch Morris centrifugal pump transfers the sand from the basin into two 8-foot-diameter Kennedy-Van Saun cone classifiers and a 5- by 5- by 35-foot drag-classifier and dewaterer of the company's own design. The 6-inch

The series of 3 belt-conveyors used for stock-piling rock for barge loading, and to feed the truck-loading bin at right.

Belt-conveyor discharging plus 2½-inch oversize into the 30- by 48-inch roll-crusher.

pipe from the pump is curved and at the outside of this curve a 3½-inch pipe is inserted which takes off the coarsest sand to the first classifier. The remainder of the sand is split between the second cone and the drag.

Over the second cone is a 3- by 6-foot revolving screen with 10-mesh cloth. The sand is fed to this screen only when masons' sand is desired. In this case the coarse particles taken out are chuted to the coarse-sand pile under the first separator and the fines go to the second separator. The product of the drag is also discharged on a pile. The drag receives through a pipe the fines which pass through the bottom decks of the two vibrating screens.

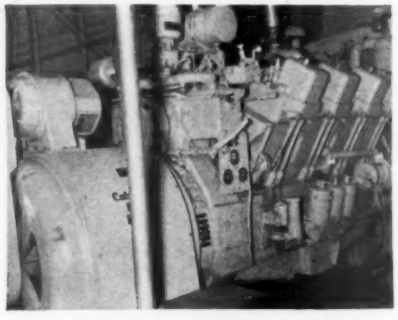
The overflow from the original 30-foot sand-settling basin goes to an 8- by 15-foot sump, where the silt settled out is removed through a waste pipe by a 4-inch Kreher centrifugal pump. The overflow from the rake classifier also goes into this sump. The overflow from the two cone classifiers also goes into this waste pipe. In the bottom of this pipe is a knife-edge deflector which draws off the heavier fine particles to a pipe leading back to the rake classifier. The main overflow pipe discharges into a large settling pond where the silt is removed at intervals by a drag-line. This material is given to anyone willing to haul it away to use for fill.

A Bucyrus-Erie 50-B drag-line is used to move and load the sand in the stock-piles. It also moves away the sand under the second cone classifier to make room for masonry sand and vice versa.

The first cone classifier makes concrete sand from 4-mesh down and well graded. The second cone makes a slightly finer concrete sand and, with the screen, a minus 8-mesh masons' sand. The drag makes a coarse sand used mainly in the manufacture of concrete blocks.

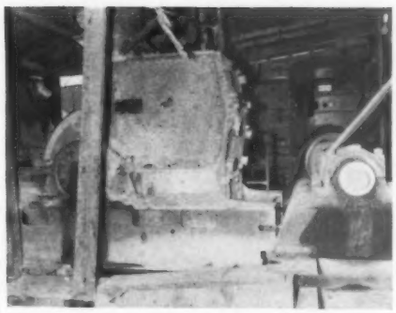
The fine material in this deposit is difficult to classify hydraulically because it consists of a combination of light lime and heavy silica particles. Some rearrangement of the sand plant is planned in order to save some of the extremely fine material now being wasted.

All the equipment in the plant is driven by Diesel engines. A 150-horsepower Waukesha-Hesselman engine drives a line-shaft with Dodge anti-



The Diesel engine with self-regulating alternator which supplies current for much of the plant equipment.

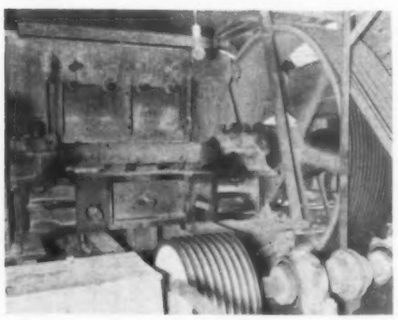
The 6-inch pump which feeds sand from settling basin to classifiers, and Diesel engine which drives it.



Impact crusher used to reduce excess coarse rock. In background is the 150-horsepower Hesselman-type Diesel engine which drives both crushers.

friction bearings and a Link-Belt peripheral-chain-type flexible coupling. From this shaft the roll-crusher is driven through 14 Browning V-belts and the impact crusher through 8 V-belts. When only the impact crusher is in use the chain is taken off the coupling, stopping the roll-crusher.

The 4- and 6-inch sand pumps at the plant are both driven by a Caterpillar D13,000 engine. A 5-inch Byron-Jack-



The 30- by 48-inch roll-crusher used to reduce all rock over 2½ inches.

son pump which supplies washwater is driven by a Caterpillar D8800 engine.

The remainder of the equipment in this plant is driven through V-belts by individual electric motors for which current is supplied by a Diesel-generator set. A Caterpillar D17,000 V8 engine is direct-connected to a Caterpillar self-regulating 440-volt, 3-phase, 142-ampere alternator rated at 85 kilowatts at 80 per cent. power factor. This compact unit requires no rheostats, regulators, etc., and has its own d.-c. generator for excitation. There is also a small generator for lighting current.

The 12-cubic yard scraper which removes overburden and rock above water level.

Much of the plant's output is now going into defense construction projects locally, at Key West, and other points. The company's local commercial business is entirely wholesale, the sales being confined entirely to dealers, contractors, block plants and other large users. Barge shipments are taken through the Tamiami Canal, a distance of 2 miles to the Miami River from which all shore points are accessible by way of the Inland Waterway.

The plant is built entirely of concrete and steel except for the tunnels under the stock-piles. These are of laminated-wood construction and have concrete floors. The conveyors are supported on steel trusses, which are of cantilever design wherever possible. Link-Belt conveyor idlers and Goodyear "Stacker" conveyor belts predominate. H. B. St. Lawrence, whose name has appeared in these pages several times in the past, designed the crusher and conveying systems and was in charge of the construction. J. L. Booth is plant superintendent and had much to do with the design of the plant.

"Chemical-Lime Specifications"

In the May issue of this publication under the above caption, the lime industry was admonished to look to and have a definite hand in maintaining standard chemical-lime specifications and marketing its products on such standards.

The demand for lime is increasing tremendously. It reflects the present activity in defense plants and allied industries. For this very reason it would not be amiss to again urge unity of purpose, individually if not collectively, because only in that manner can we obtain a full measure of value from our economic resources. The Department of Commerce, Bureau of Standards is at this time revising its list of *Willing to Certify Sources of Supply* on commodities covered by Federal Specifications and Commercial Standards. Federal specifications are those which are prepared by official federal government agencies for their use. Although these specifications are of real interest to producers desiring to supply products based on them, it is not encumbent upon producers to restrict their contracts or transactions to these commodities or specifications. However, it can readily be seen that in following such a procedure voluntarily, much lost motion is avoided and our federal agencies are free to purchase essential supplies having foreknowledge of the suitability of such products as are certified. In these times this is very essential.

Commercial Standards represent specifications voluntarily developed and supported by producers and consumers as a basis for orderly marketing by such industries as are concerned. Both procedures inure to the benefit of industry as a whole and make for unity. They aid in giving full value for value received at a time never as urgent and vital as to-day.

A suggested basis for such specifications on chemical lime is 90 per cent. available calcium, where high-calcium lime is produced or specified, and 90 per cent. combined available calcium and magnesium oxide, when the dolomite or magnesium type of lime is offered. The accompanying chart is submitted as a basis for evaluating lime on a percentage basis and as an aid in determining fair values predicated upon the varying analyses of lime. It can be applied to any lime product, given a plant or delivered price and having a knowledge of the actual percentage of available lime delivered to the consumer. The figure 90 per cent. is given because it has been recognized as a balance point, below which penalties may be assessed and in the event of a higher percentage, a bonus would apply. Such a procedure allows active competition among producers and assures the buyer of a fair price. Singularly, it tends to place into use limes of various analyses in processes where higher qualities of a specific nature are economically desirable, regardless of where the demand may arise and without burdening the user or the supplier. —("Onlooker.")

CHEMICAL LIME
EVALUATION CHART

Premium Limes		Prices Used Merely for Example
PERCENTAGE	PRICE	PRICE
98%	$11.43	$10.38
97%	11.31	10.26
96%	11.19	10.14
95%	11.08	10.03
94%	10.96	9.91
93%	10.84	9.79
92%	10.73	9.68
91%	10.61	9.56
*90%	10.50	9.44
89%	PER TON	9.33
88%		
87%		
86%		
85%		
84%		
83%		
82%		
81%		
80%		

* Standard specification.

THE DENSITY OF RAW-MATERIAL SLURRY

By W. R. BENDY
Cement Engineer
Claverack, New York

IN wet-process cement plants the weight of dry raw material per unit volume of slurry should be known exactly over the working range of moisture contents. This allows measurements of slurry volume to be converted into equivalent weights of dry raw material. The number of pounds of dry raw material required per barrel of clinker is affected by dust losses and ignition loss, and may vary from time to time. When an average figure has been determined by experience or by test, slurry volumes can be calculated directly into clinker output.

One hundred grams of slurry containing 40 per cent. moisture is made up of:

40 grams of water
60 grams of raw material

At 30 degrees C. (86 F.) water weighs 0.9957 grams per cc. If the dry raw material weighs 2.700 grams per cc., the density of the slurry may be calculated as follows:

60 grams of raw material at 2.700 grams per cc. occupies a volume of $\frac{60}{2.700} = 22.22$ cc.

40 grams of water weighing 0.9957 grams per cc. occupies a volume of $\frac{40}{0.9957} = 40.17$ cc.

100 grams of slurry occupies a total volume ..... $= 62.39$ cc.

$\frac{60}{62.39} = 0.962$ grams of solids per cc. of slurry

$\frac{40}{62.39} = 0.641$ grams of water per cc. of slurry

$\frac{100}{62.39} = 1.063$ grams total weight per cc. of slurry

The same calculations may be made in general terms:

P = Percentage of moisture in slurry.
R = Density of raw material in grams per cc.
d = Density of water in grams per cc.

$$\text{Grams of raw material per cc. of slurry} = \frac{1}{\frac{P}{d(100-P)} + \frac{1}{R}}$$

$$\text{Grams of water per cc. of slurry} = \frac{1}{\frac{(100-P)}{PR} + \frac{1}{d}}$$

$$\text{Total weight of slurry, grams per cc.} = \frac{100}{\frac{(100\,P)}{R} + \frac{P}{d}}$$

There are several well-known methods for determining the density or specific gravity of solids. Usually they involve the use of some liquid in which the solid neither dissolves nor reacts. In this case, however, we are interested only in the apparent density in water, which value may be affected by the so-

Table I—COMPONENT WEIGHTS OF SLURRY
All figures in this table are in grams per cc. of slurry at 30 degrees C.
See Table II for multiplying factors.

Moisture in Slurry (%)		Density of Dry Raw Material (grams per cc.)										
		2.70	2.71	2.72	2.73	2.74	2.75	2.76	2.77	2.78	2.79	2.80
30	Dry Material	1.249	1.251	1.253	1.255	1.257	1.259	1.261	1.264	1.266	1.268	1.270
	Water	0.535	0.536	0.537	0.538	0.539	0.540	0.541	0.541	0.542	0.543	0.544
	Slurry	1.784	1.787	1.790	1.793	1.796	1.799	1.802	1.805	1.808	1.811	1.814
31	Dry Material	1.217	1.219	1.221	1.223	1.225	1.227	1.229	1.231	1.233	1.235	1.237
	Water	0.547	0.548	0.549	1.550	0.551	0.552	0.552	0.553	0.554	0.555	0.556
	Slurry	1.764	1.767	1.770	1.773	1.776	1.779	1.781	1.784	1.787	1.790	1.793
32	Dry Material	1.186	1.188	1.190	1.192	1.194	1.196	1.197	1.199	1.201	1.203	1.205
	Water	0.558	0.559	0 560	0.561	0.562	0.563	0.564	0.565	0.566	0.567	0.567
	Slurry	1.744	1.747	1.750	1.753	1.756	1.759	1.761	1.764	1.767	1.770	1.772
33	Dry Material	1.156	1.158	1.160	1.161	1.163	1.165	1.167	1.169	1.170	1.172	1.174
	Water	0.569	0.570	0.571	0.572	0.573	0.574	0.575	0.575	0.577	0.578	0.578
	Slurry	1.725	1.728	1.731	1.733	1.736	1.739	1.742	1.744	1.747	1.750	1.752
34	Dry Material	1.126	1.128	1.130	1.132	1.133	1.135	1.137	1.138	1.140	1.142	1.144
	Water	0.581	0.581	0.582	0.583	0.584	0.585	0.585	0.587	0.587	0.588	0.589
	Slurry	1.707	1.709	1.712	1.715	1.717	1.720	1.722	1.725	1.727	1.730	1.733
35	Dry Material	1.098	1.099	1.101	1.102	1.104	1.106	1.107	1.109	1.110	1.112	1.114
	Water	0.591	0.592	0.593	0.594	0.595	0.595	0.596	0.597	0.598	0.599	0.599
	Slurry	1.689	1.691	1.694	1.696	1.699	1.701	1.703	1.706	1.708	1.711	1.713
36	Dry Material	1.069	1.071	1.072	1.074	1.075	1.077	1.078	1.080	1.081	1.083	1.085
	Water	0.602	0.602	0.603	0.604	0.605	0.606	0.607	0.608	0.609	0.609	0.610
	Slurry	1.671	1.673	1.675	1.678	1.680	1.683	1 685	1.688	1.690	1.692	1.695
37	Dry Material	1.041	1.043	1.044	1.046	1.047	1.049	1 050	1.052	1.053	1.055	1.056
	Water	0.612	0.612	0.614	0.614	0.615	0.616	0.617	0.617	0.619	0.619	0.620
	Slurry	1.653	1.655	1.658	1.660	1.662	1.665	1.667	1.669	1.672	1.674	1.676
38	Dry Material	1.014	1.016	1.017	1.018	1.020	1.021	1.023	1.024	1.025	1.027	1.028
	Water	0.622	0.622	0.623	0.624	0.625	0.626	0.627	0.628	0.629	0.629	0.630
	Slurry	1.636	1.638	1.640	1.642	1.645	1.647	1.650	1.652	1.654	1.656	1.658
39	Dry Material	0.988	0.989	0.990	0.992	0.993	0.994	0.996	0.997	0.998	0.999	1.001
	Water	0.631	0.632	0.633	0.634	0.635	0.636	0.636	0.637	0.638	0.639	0.640
	Slurry	1.619	1.621	1.623	1.626	1.628	1.630	1.632	1.634	1.636	1.638	1.641
40	Dry Material	0.962	0.963	0.964	0.965	0.967	0.968	0.969	0.970	0.972	0.973	0.974
	Water	0.641	0.642	0.643	0.644	0.644	0.645	0.646	0.647	0.647	0.648	0.649
	Slurry	1.603	1.605	1.607	1.609	1.611	1.613	1.615	1.617	1.619	1.621	1.623
41	Dry Material	0.936	0.937	0.938	0.940	0.941	0.942	0.943	0.944	0.945	0.947	0.948
	Water	0.651	0.652	0.653	0.653	0.654	0.655	0.656	0.657	0.657	0.657	0.658
	Slurry	1.587	1.589	1.591	1.593	1.595	1.597	1.599	1.601	1.602	1.604	1.606
42	Dry Material	0.911	0.912	0.913	0.914	0.916	0.917	0.918	0.919	0.920	0.921	0.922
	Water	0.660	0.661	0.662	0.663	0.663	0.663	0.664	0.665	0.666	0.667	0.668
	Slurry	1.571	1.573	1.575	1.577	1.579	1.580	1.582	1.584	1.586	1.588	1.590
43	Dry Material	0.887	0.888	0.889	0.890	0.891	0.892	0.893	0.894	0.895	0.896	0.897
	Water	0.668	0.669	0.670	0.671	0.672	0.673	0.673	0.674	0.675	0.676	0.677
	Slurry	1.555	1.557	1.559	1.561	1.563	1.565	1.566	1.568	1.570	1.572	1.574
44	Dry Material	0.862	0.863	0.864	0.865	0.866	0.867	0.868	0.869	0.870	0.871	0.872
	Water	0.678	0.679	0.680	0.681	0.681	0.682	0.683	0.684	0.684	0.685	0.686
	Slurry	1.540	1.542	1.544	1.546	1.547	1.549	1.551	1.553	1.554	1.556	1.558
45	Dry Material	0.839	0.840	0.841	0.842	0.843	0.844	0.845	0.845	0.846	0.847	0.848
	Water	0.686	0.687	0.688	0.688	0.689	0.690	0.691	0.692	0.693	0.694	0.694
	Slurry	1.525	1.527	1.529	1.530	1.532	1.534	1.536	1.537	1 539	1.541	1.542
46	Dry Material	0.816	0.817	0.818	0.818	0.819	0.820	0.821	0.822	0.823	0.824	0.825
	Water	0.695	0.695	0.696	0.697	0.698	0.699	0.700	0.700	0.701	0.701	0.702
	Slurry	1.511	1.512	1.514	1.515	1.517	1.519	1.521	1.522	1.524	1.525	1.527
47	Dry Material	0.793	0.794	0.795	0.796	0.797	0.797	0.798	0.799	0.800	0.801	0.801
	Water	0.703	0.704	0.704	0.705	0.706	0.707	0.708	0.708	0.709	0.710	0.711
	Slurry	1.496	1.498	1.499	1.501	1.503	1.504	1.506	1.507	1.509	1.511	1.512
48	Dry Material	0.771	0.772	0.772	0.773	0.774	0.775	0.776	0.776	0.777	0.778	0.779
	Water	0.711	0.712	0.713	0.714	0.714	0.715	0.716	0.717	0.717	0.718	0.718
	Slurry	1.482	1.484	1.485	1.487	1.488	1.490	1.492	1.493	1.494	1.496	1.497
49	Dry Material	0.749	0.750	0.750	0.751	0.752	0.753	0.753	0.754	0.755	0.756	0.756
	Water	0.719	0.720	0.721	0.722	0.722	0.723	0.724	0.725	0.725	0.726	0.727
	Slurry	1.468	1.470	1.471	1.473	1.474	1.476	1.477	1.479	1.480	1.482	1.483
50	Dry Material	0.727	0.728	0.729	0.730	0.730	0.731	0.732	0.732	0.733	0.734	0.735
	Water	0.728	0.728	0.729	0.729	0.731	0.731	0.732	0.733	0.733	0.734	0.734
	Slurry	1.455	1.456	1.458	1.459	1.461	1.462	1.464	1.465	1.466	1.468	1.469

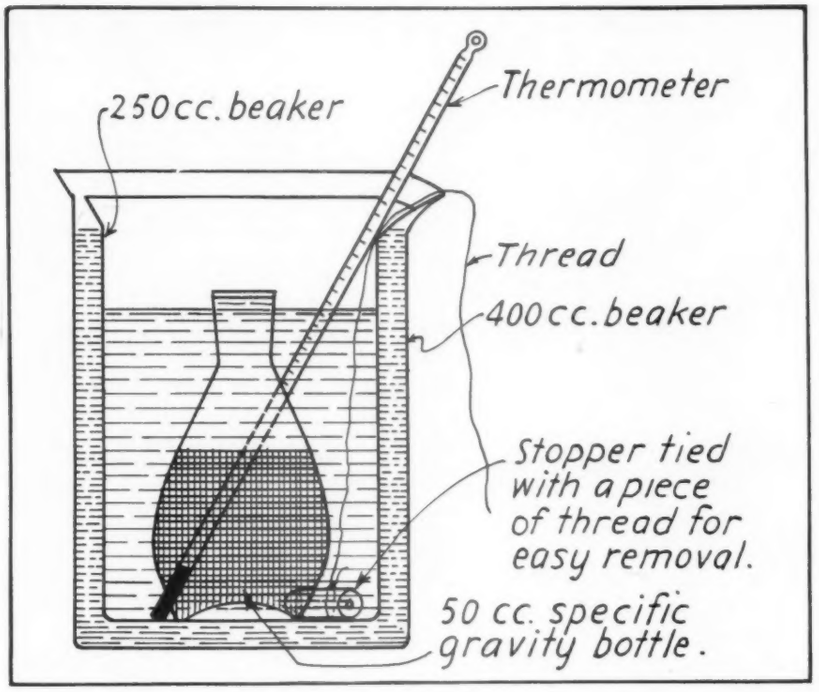


Figure 1—Apparatus for determining density of slurry.

lution of small quantities of the solids and also by drying and subsequent rewetting. Methods which involve drying as a preliminary step may give a density figure as much as ½ per cent. lower than the apparent value in actual slurry. Therefore, it is preferable to make the determination on wet slurry without drying.

For accurate work with a gritty material like slurry the use of an ordinary specific-gravity bottle, or pycnometer. presents difficulties. These may be avoided by the following method, for which the only special apparatus necessary is an unadjusted specific-gravity bottle of 50-cc. capacity. The specific-gravity bottle is weighed under four conditions:

(1) Dry and empty.
(2) Full of distilled water.
(3) Partly filled with slurry.
(4) Completely filled with water on top of the slurry weighed in (3).

In addition, the percentage of moisture in the slurry must be determined separately, and the density of the water at the temperature of the test must be known.

For accurate results care must be taken to have the bottle, the contents, and the stopper at exactly the standard temperature when the stopper is inserted. To obtain a stable and exact temperature, a double water bath is used as shown in Figure 1.

The beakers are partly filled with water at approximately the standard temperature and are placed one inside the other. The temperature of the water in the inner beaker is then adjusted exactly by gently warming or cooling the outer beaker; it should be held within 0.1 degree C. of the standard temperature for at least 15 minutes to allow the bottle and contents to attain a steady temperature. The stopper is then removed from the beaker and quickly inserted in the mouth of the bottle.

Excess water is wiped off the end of the capillary opening in the stopper *before* the bottle is removed from the bath. Then the bottle is removed, dried on the outside, and weighed. When the bottle is removed from the bath, slight temperature changes sometimes cause a bead of water to be forced out of the capillary. This should not be wiped off. At other times, the level may fall in the capillary. In neither case is there any error, provided the capillary opening in the stopper is level full while the bottle is still in the constant-temperature bath.

Slurry may be placed in the bottle with a pipette, so as to leave the inside of the neck perfectly clean. It is usually convenient to fill the bottle about three-quarters full of slurry. After weighing the bottle is filled up with distilled water, which is dropped slowly down the side to avoid agitating the slurry. Then the temperature is adjusted exactly and the stopper is inserted as described above.

If the slurry is thick enough to contain air bubbles, the procedure should be varied slightly. The bottle is filled only about half full of slurry, and water is added to about the three-quarters point. The forefinger is placed over the opening, and the mixture is thoroughly shaken to dilute the slurry and to allow the escape of bubbles of entrapped air. The mixture is then allowed to settle, and any particles of slurry adhering to the inside of the neck are carefully washed down. Finally, the bottle is completely filled with distilled water, which is added carefully so that only clear water remains at the top and the final closing of the stopper is not impeded by gritty particles.

Calculations are based on the apparent density of the "dry" raw material. For many raw materials it is difficult to define exactly the condition "dry." Therefore, in determining the moisture content of the original slurry sample the ordinary control procedure should be used instead of more refined methods of drying, such as double drying, pulverizing before the final drying, or cooling in a desiccator, which are not usually followed in ordinary control work. The slurry-moisture records at most plants are the averages of the routine control determinations, and are used in all calculations. If, in de-

TABLE II—MULTIPLYING FACTORS TO CONVERT WEIGHT OF DRY RAW MATERIAL (in grams per cc. of slurry) INTO BARRELS OF CLINKER PER CUBIC FOOT OF SLURRY

Raw Material (pounds per barrel of clinker)	Multiplying Factor	Raw Material (pounds per barrel of clinker)	Multiplying Factor	Raw Material (pounds per barrel of clinker)	Multiplying Factor
570	0.1095	590	0.1058	610	0.1023
571	0.1093	591	0.1056	611	0.1022
572	0.1091	592	0.1055	612	0.1020
573	0.1090	593	0.1053	613	0.1018
574	0.1088	594	0.1051	614	0.1017
575	0.1086	595	0.1049	615	0.1015
576	0.1084	596	0.1047	616	0.1013
577	0.1082	597	0.1046	617	0.1012
578	0.1080	598	0.1044	618	0.1010
579	0.1078	599	0.1042	619	0.1009
580	0.1076	600	0.1041	620	0.1007
581	0.1075	601	0.1039		
582	0.1073	602	0.1037		
583	0.1071	603	0.1035		
584	0.1069	604	0.1034		
585	0.1067	605	0.1032		
586	0.1065	606	0.1030		
587	0.1064	607	0.1029		
588	0.1062	608	0.1027		
589	0.1060	609	0.1025		

Table III—BARRELS OF CLINKER PER CUBIC FOOT OF SLURRY
Temperature: 30 degrees C. Raw-Material Density: 2.73 grams per cc.

Moisture in Slurry (%)	Dry Raw Material (pounds per barrel of clinker)										
	570	575	580	585	590	595	600	605	610	615	620
30	0.1375	0.1363	0.1351	0.1339	0.1328	0.1317	0.1306	0.1295	0.1285	0.1274	0.1264
31	0.1340	0.1328	0.1317	0.1305	0.1294	0.1283	0.1273	0.1262	0.1252	0.1242	0.1232
32	0.1305	0.1294	0.1283	0.1272	0.1261	0.1251	0.1240	0.1230	0.1220	0.1210	0.1200
33	0.1272	0.1261	0.1250	0.1239	0.1229	0.1219	0.1209	0.1199	0.1189	0.1179	0.1170
34	0.1239	0.1229	0.1218	0.1208	0.1197	0.1187	0.1177	0.1168	0.1158	0.1149	0.1139
35	0.1207	0.1197	0.1187	0.1176	0.1166	0.1157	0.1147	0.1138	0.1128	0.1119	0.1110
36	0.1176	0.1166	0.1156	0.1146	0.1136	0.1127	0.1117	0.1108	0.1099	0.1090	0.1081
37	0.1145	0.1136	0.1126	0.1116	0.1107	0.1097	0.1088	0.1079	0.1070	0.1062	0.1053
38	0.1115	0.1106	0.1096	0.1087	0.1078	0.1069	0.1060	0.1051	0.1042	0.1034	0.1026
39	0.1086	0.1077	0.1067	0.1058	0.1049	0.1040	0.1032	0.1023	0.1015	0.1007	0.0999
40	0.1057	0.1048	0.1039	0.1030	0.1021	0.1013	0.1004	0.0996	0.0988	0.0980	0.0972
41	0.1029	0.1020	0.1011	0.1003	0.0994	0.0986	0.0978	0.0970	0.0962	0.0954	0.0946
42	0.1001	0.0993	0.0984	0.0976	0.0968	0.0959	0.0951	0.0944	0.0936	0.0928	0.0921
43	0.0974	0.0966	0.0958	0.0949	0.0941	0.0933	0.0926	0.0918	0.0911	0.0903	0.0896
44	0.0948	0.0940	0.0932	0.0924	0.0916	0.0908	0.0901	0.0893	0.0886	0.0879	0.0871
45	0.0922	0.0914	0.0906	0.0898	0.0891	0.0883	0.0876	0.0869	0.0861	0.0854	0.0848
46	0.0896	0.0889	0.0881	0.0873	0.0866	0.0859	0.0852	0.0845	0.0838	0.0831	0.0824
47	0.0871	0.0864	0.0856	0.0849	0.0842	0.0835	0.0828	0.0821	0.0814	0.0808	0.0801
48	0.0847	0.0839	0.0832	0.0825	0.0818	0.0811	0.0804	0.0798	0.0791	0.0785	0.0779
49	0.0823	0.0816	0.0809	0.0802	0.0795	0.0788	0.0782	0.0775	0.0769	0.0763	0.0756
50	0.0799	0.0792	0.0785	0.0779	0.0772	0.0765	0.0759	0.0753	0.0747	0.0741	0.0735

termining dry raw-material density, the moisture is determined by the regular method, the final results in terms of slurry density will be correct even though the moisture content may be slightly in error.

The calculation of the density of the dry raw material is made as follows:

P = Percentage of moisture in slurry.

d = Density of water at temperature of determination.

B = Weight of empty bottle (carefully dried).

W = Weight of bottle full of water.

S = Weight of bottle partly filled with slurry.

T = Weight of bottle containing slurry and filled up with water.

$$\text{Density of dry raw material} = \frac{d}{1 - \dfrac{(T - W)}{(S - B)\left(1 - \dfrac{P}{100}\right)}} \text{ grams per cc.}$$

Table IV—PRESSURE
(pounds per square inch per foot of head of slurry)
Temperature: 30 degrees C. Raw-Material Density: 2.73 grams per cc.

Moisture in Slurry (%)	Pressure (pounds per square inch per 1 foot of head)
30	0.777
31	0.769
32	0.760
33	0.752
34	0.743
35	0.735
36	0.727
37	0.720
38	0.712
39	0.705
40	0.698
41	0.691
42	0.684
43	0.677
44	0.670
45	0.664
46	0.657
47	0.651
48	0.645
49	0.639
50	0.633

Example:

Temperature . . 30 degrees C.
Weight of empty bottle . . . . $B = 17.6455$ grams.
Weight of bottle full of water . $W = 67.0957$ grams.
Weight of bottle partly filled with slurry . . $S = 73.4633$ grams.
Weight of bottle, slurry and water . . . . . $T = 90.3442$ grams.
Slurry moisture . $P = 34.18$ per cent.
Density of water at 30 degrees C. . . . . $d = 0.9957$ grams per cc.

$$\text{Density of dry raw material} = \frac{0.9957}{1 - \dfrac{(90.3442 - 67.0957)}{(73.4633 - 17.6455)\left(1 - \dfrac{34.18}{100}\right)}}$$

$$= 2.712 \text{ grams per cc.}$$

The various types of raw material used in cement manufacture might be expected to show substantially different densities. Although the individual components of a mix do vary in density, the values for the final kiln feed seem to vary only within a comparatively narrow range, even with diverse types of raw materials from widely-separated localities.

The average results for ten different raw materials are given below:

AVERAGE DENSITIES FOR 10 DIFFERENT CEMENT RAW MATERIALS

2.746 grams per cc.
2.730 grams per cc.
2.758 grams per cc.
2.704 grams per cc.
2.740 grams per cc.
2.729 grams per cc.
2.721 grams per cc.
2.712 grams per cc.
2.732 grams per cc.
2.746 grams per cc.
2.732 grams per cc.

Average:
Range: 2.704 to 2.758.

In the absence of definite knowledge a value of 2.73 grams per cc. may be assumed with little possibility of serious error. However, for accurate work, the value should be actually determined.

Table I gives the component weights of 1 cc. of slurry at 30 degrees C. for densities of the dry raw material ranging from 2.70 to 2.80 grams per cc., and for moisture contents from 30 to 50 per cent. For example, with a raw-material density of 2.75 grams per cc. and 36 per cent. moisture, slurry is made up of:

	Grams per 1 cc. of Slurry
Raw material	1.077
Water	0.606
Total Slurry	1.683

The first figure, showing grams of raw material per cc. of slurry, if multiplied by the factors at the bottom of the table, gives barrels of clinker per cubic foot of slurry for various weights of dry raw material per barrel. In the above example, if 596 pounds of dry raw material is required per barrel:

$1.077 \times 0.1047 = 0.1128$ barrels of clinker per cubic foot of slurry.

Multiplying factors to convert weight of the dry raw material into barrels of clinker will be found in Table II.

Table III gives the barrels of clinker per cubic foot of slurry at various weights of dry raw material per barrel and for a raw-material density of 2.73 grams per cc., which appears to be a good average value. If the raw-material density varies by $\pm$ 0.03 (2.70 or 2.76 grams per cc.) the error caused by using this table, based on 2.73 grams per cc., amounts only to about 0.4 per cent.

Table IV gives the static pressure per 1 foot head of slurry at various moisture contents. It also is based on a raw-material density of 2.73 grams per cc.

Two Kilns Being Joined at Port Huron Plant

Two rotary kilns are being joined to make a single kiln 400 feet long at the plant of the Peerless Cement Corporation at Port Huron, Michigan.

The new unit is scheduled to go into operation about August 1.

The Cass City Sand & Gravel Company, Cass City, Michigan, has opened a marl deposit near its gravel plant and is selling the material to farmers for liming their land.

DOMESTIC POTASH SUPPLY NOW AMPLE

Aërial view of the workings of the Potash Company of America. This picture was taken before the third storage building was erected at the right of the tracks.

Operations of Potash Company of America in Carlsbad Area Typical of Development Which Has Freed U. S. of Need for Imports

THE progress that has been made in this country toward self-sufficiency in the production of raw materials is well illustrated by the history of the native potash industry. Now, with Europe again at war and foreign sources of potash cut off, the domestic industry is fully able to meet all essential needs at a reasonable price. There is no possibility of a repetition of what happened after the outbreak of the first World War. The domestic production of potash was then insignificant and when imports were cut off and stocks exhausted prices sky-rocketed. The result was felt by the public in the high prices demanded for certain farm products that cannot be grown successfully without fertilizer.

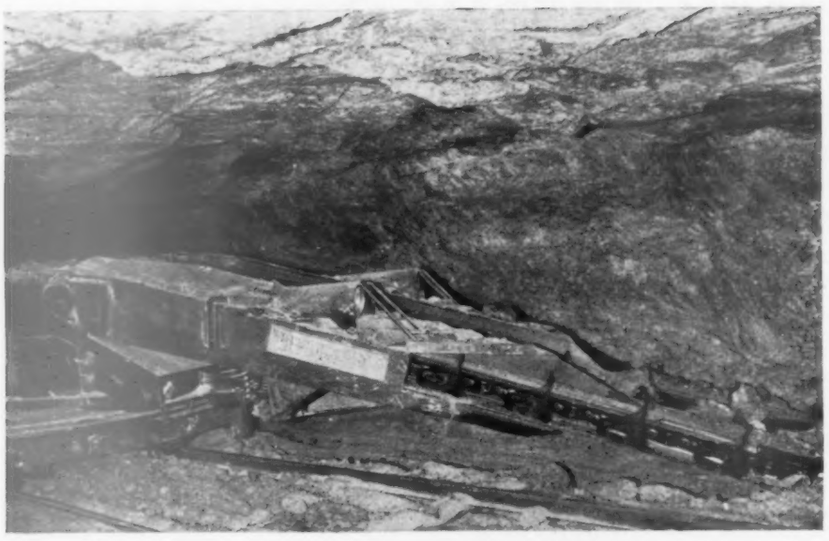
The fact that this country is now self-sufficient in this respect is directly due to the foresight of our government in locating deposits and fostering the development of a domestic industry. Much prospecting was done in various sections and test core drillings were made in southeastern New Mexico, for example, which proved beyond doubt that potash existed in that area in commercial quantities. The first shaft for potash was sunk near Carlsbad, New Mexico, late in 1929.

The Potash Company of America started and completed its first shaft near Carlsbad in 1933. Its air shaft was started in 1934 and was completed in November 1936. The company's plant went into operation in 1934 and in 1936 its capacity was doubled. The main shaft is used for bringing out the raw ore and is completely equipped with man cages used for employees and for supplies. The air shaft is equipped with a 150,000-cubic foot-per-minute fan which keeps the mine well ventilated and is so arranged that the air current can quickly be reversed. A hoist and man cages are provided to be used in case of trouble in the main shaft. There is no gas hazard and no water seepage and no timbering is required. The deposit is at a depth of about 1,000 feet and is a flat vein.

Mining is done by the room-and-pillar system commonly used in coal and limestone mines and the methods and equipment used are also similar. The potash ore is not hard but is tough and tenacious and can only be broken into the small pieces necessary for efficient loading by using an excess of explosive. As an aid to blasting all faces are undercut with short-wall chain machines. These machines effect a saving in the cost and handling of explosives, give a smooth floor for the mechanical loading machines and give better control of the line of recovery between the high- and low-grade salts.

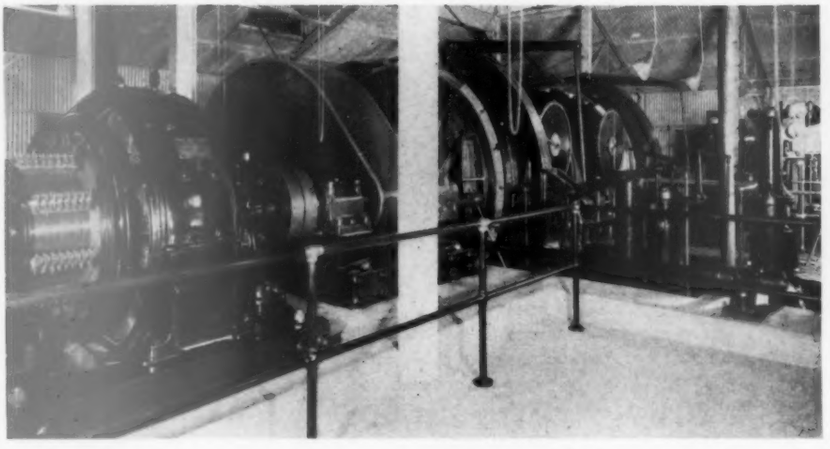
The cutter bars of the Sullivan undercutters are about 9 feet long and cut at the rate of 4 to 6 inches per minute. Drilling is done with Jeffrey mounted electric auger drills with 1½-horsepower motors. Usually five holes are spaced vertically in a 10-foot face and the horizontal spacing is about 3 feet. A 60 per cent. gelatin dynamite is used which has enough speed to fracture the crystalline structure of the ore. All shots are detonated electrically.

The loading is done by a track-mounted Jeffrey face loader with an 11-foot loading boom and by three Sul-



One of the low-clearance loaders used in the mine.

One of the 15-ton electric trolley locomotives in the mine. Standing at the left is A. W. Kangas, mine foreman.



The 600-horsepower double-drum electric-powered hoist which raises and lowers the skips at 1,200 feet per minute.

livan scraper loaders. The scrapers are equipped with three drums and a box-type bucket. Six-ton Mancha electric storage-battery locomotives collect the loaded 5-ton solid mine cars into trains of about 20 cars each. The trains are hauled to the mine shaft by a Westinghouse 15-ton trolley locomotive. Three combination battery and trolley locomotives with 12 tons on drivers and two 8-ton trolley cable reel locomotives are used for auxiliary service.

The ore is discharged from the cars by a Card rotary car dumper to a pan conveyor ahead of the Jeffrey primary

An undercutter at work below ground prior to drilling for a blast.

crusher which has a single toothed roll. The 4-inch-minus product of the crusher drops into a skip pocket from which it is loaded semi-automatically by a Link-Belt counterbalanced chute feeder into the two 5-ton underslung skips. The skips and cages are in balance when empty and are operated by a 600-horsepower Nordberg double-drum electric hoist at a speed of 1200 feet per minute. The hoist is equipped with speed and overwind controls. The mine

One of the three scraper-loaders with its 3-drum hoist.

Operator with one of the electric twist-drills used in the mine.

capacity with existing equipment is about 250 tons per hour. Operating two shifts daily 5 days a week the output is sufficient to keep the plant running continuously.

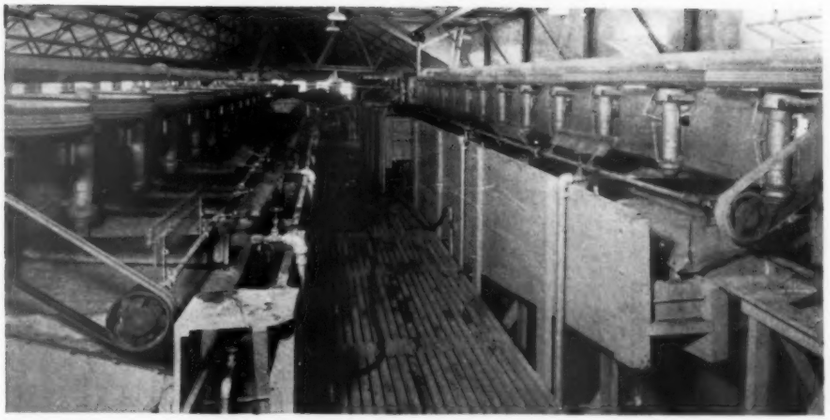
The ore is discharged from the skip buckets into raw-material storage bins beside the skip head-frames with a total capacity of 1500 tons.

Belt conveyors are used to feed the

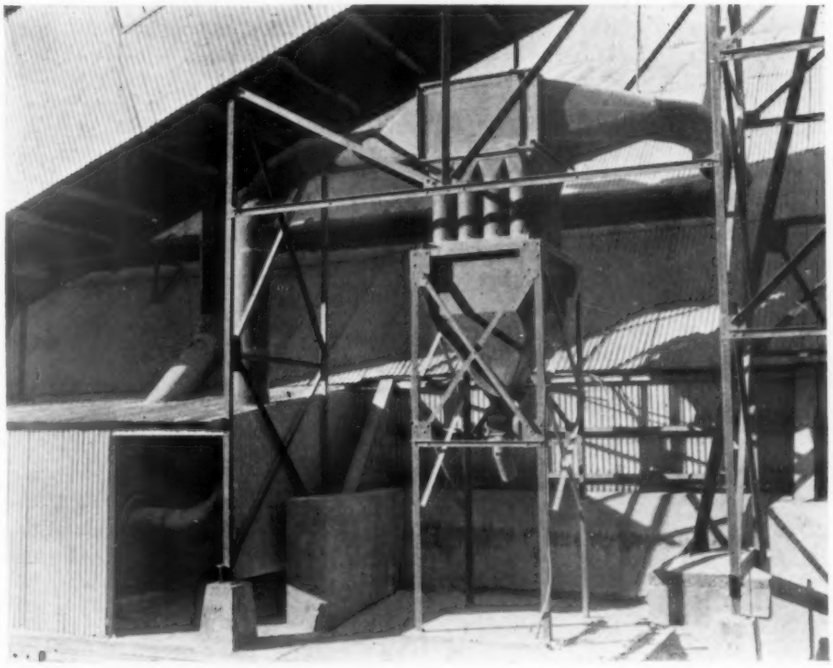
The Number 1 shaft with cooling tower at left and bins at right.

ore into the mill building where it is discharged over a grizzly. Oversize ore goes to a Symons cone crusher. Grizzly throughs go on a Jeffrey-Traylor electric vibrating screen which removes minus-10-mesh material. The material over this screen together with that through the cone crusher goes to four similar 10-mesh screens ahead of four Allis-Chalmers Power & Mining double-roll

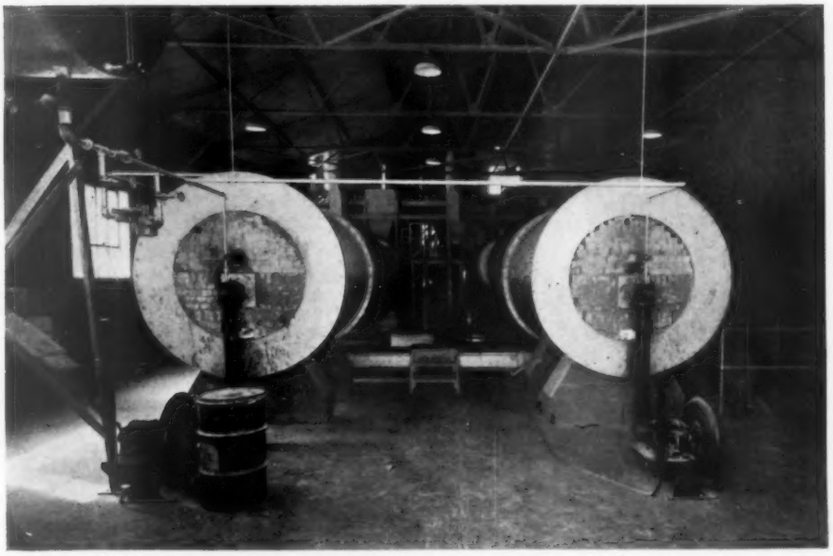
(*Continued on page 55*)



Looking west in the refinery building. New flotation machines in the foreground.



The dust-collector system which keeps loading operations practically dust-free.



Two rotary driers which handle the filter product.

Aggregates, Cement, and Lime Topics of Chief Interest at A. S. T. M. Meet

INTENSIVE interest in the field of engineering materials particularly in the development of knowledge of materials, and in the standardization of specifications and tests, was evident at the forty-fourth annual meeting of the American Society for Testing Materials held at the Palmer House, Chicago, during the week of June 23.

The registered attendance of members, committee members and guests exceeded that of any other meeting, reaching a total of 1,553.

Progress in the field of standardization is indicated by the some 70 new specifications and tests published for the first time, many providing quality requirements and procedures for testing extremely important engineering materials and products.

There were 17 technical sessions at which the 115 technical papers and reports were presented. All the sessions and committee meetings were well attended and a great many engineers in the Chicago area took advantage of the meeting to hear the country's leading materials men discuss the various topics.

New officers are as follows: G. E. F. Lundell, chief of the Chemistry Division, National Bureau of Standards, succeeds W. M. Barr as president; Dean Harvey, materials engineers, Engineering Laboratories and Standards Department, Westinghouse Electric & Manufacturing Company, was chosen vice-president to serve with H. J. Ball, professor of textile engineering, Lowell Textile Institute, who was elected vice-president in 1940.

The session devoted to concrete and concrete aggregates included a number of interesting technical papers. In this session also there was presented to W. T. Thomson the second Sanford E. Thompson Award which is made each year by Committee C-9 for the outstanding research paper in this field presented at the previous A.S.T.M. annual meeting. His paper covered *A Method of Measuring Thermal Diffusivity and Conductivity of Stone and Concrete.*

A number of changes in standards were proposed by Commitee C-9, including the Tentative Specifications for Ready-Mixed Concrete.

G. E. Troxell described *The Effect of Capping Methods and End Conditions Before Capping Upon the Compressive Strength of Concrete Test Cylinders.* Materials used in the investigation included: (1) Hydrostone, a high-strength gypsum product; (2) Castite, a sulphur-silica mixture; (3) oiled steel shot; (4) dry steel shot; (5) plaster of Paris tested at age of ½ hour; and (6) plaster of Paris tested at age of 1 hour. He concluded that considering over-all costs of labor and materials, Castite caps are cheaper than those made of any of the other materials tested.

Professor G. A. Maney described his theory of action of concrete under sustained working loads as evidence that shrinkage dominates time yield. He pointed out that some small amount of flow might exist under working loads, but it is quite evident that all the important time yields under load which have in the past been attributed by all investigators to "plastic flow" are merely elastic redistributions of stress and strain due to nonuniform shrinkage or "warping." It is thought that if much of our tremendous mass of experimental data in this field were re-evaluated on the basis of our new knowledge of non-uniform shrinkage, further support of these conclusions would be made available.

A device for studying the workability of concrete was described by T. C. Powers and E. M. Wiler. This machine is capable of distorting a plastic mass at any desired rate and of giving an automatically recorded graph of the acting force and of the rate and degree of distortion. This device is designed for a laboratory study of paste, mortar, and concrete mixes.

Of particular interest in this session was the presentation of three papers for revised report on the significance of tests of concrete and concrete aggregates comprising contributions from H. J. Gilkey, H. F. Kriege, M. A. Swayze, and M. O. Withey. Professor Gilkey covered the significance of tests for size, shape, surface texture, and grading of aggregates. He concluded by saying "it must be constantly kept in mind that tests are significant only if the results are properly representative of the material to be used. In the field of aggregates, the precautions surrounding the selection of samples are of the utmost importance. It must be remembered further that results which fairly represent the average for a large bin or stock-pile may be worthless if within the mass there is much segregation of sizes, since local variations cause fluctuations from batch to batch.

"The performance and reporting of tests on concrete aggregates is likely to be simpler than the task of maintaining the quality of control that insures a proper correlation between the figures and the facts."

Mr. Swayze, in pointing out the significance of density and unit weight of concrete, stated that the control of the air content in concrete by specification limits would seem ill-advised at this time. Results obtained are so dependent on cement content, concrete consistency, and even the method of mixing, that a specification of this sort would have to cover an extremely wide range of values.

On the other hand, under field conditions, where fixed proportions of materials are being used, determinations of air content or even unit weight, used in conjunction with consistency measurements, will provide valuable means for the control of concrete uniformity.

The significance of permeability and absorption of concrete was covered by Prof. M. O. Withey, who pointed out that the evidence indicates that on account of the abnormal effects produced in drying, the data gathered in the absorption tests usually specified are not well correlated with durability, strength, or density. There is some correlation between the rate of absorption and the resistance to freezing and thawing and to the attack of silage acids.

The permeability to water-vapor test furnishes information concerning the amount of water which may pass through an uncracked wall of concrete of a given mix when subjected to differences in vapor pressure on the opposite faces.

The capillarity-evaporation test enables estimates to be made of the amount of water that is likely to be evaporated from the free surface of a concrete wall or slag when the opposite face is in contact with water or under a head of water too low to cause leakage.

In its first formal report since the committee was organized in 1938, Committee C-16 on Thermal Insulating Materials submitted six important new standards providing needed tests for these products. Included were tests for compressive strength and flexural strength of preformed block type thermal insulating materials; procedures for the sampling of thermal insulating cements and the preparation, by trowel mixing, of the specimens for use in all tests on these cements; also a method

covering the procedure for determining the bulk density of thermal-insulating cements to permit the calculation of the necessary storage space for a given quantity of cement in packages as received.

Committee C-7 on Lime reported progress in a number of matters, including 23 proposed definitions which it is hoped can be agreed on during the next year. The committee also had an interesting display of apparatus in the exhibit.

Revised specifications for gypsum partition tile or block were offered by Committee C-11 on Gypsum. These cover a gypsum building unit in the form of tile or block for use in non-load-bearing construction in the interior of buildings and for the protection of columns, elevator shafts, etc., against fire. The words "tile" and "block" are synonymous and are used so as to be in accord with certain freight-association nomenclature. Gypsum cored tile, 3 or 4 inches in thickness, may be split and used for furring purposes.

The outstanding recommendation of Committee C-1 on Cement was the recommendation to submit to letter ballot of the society for adoption as a formal standard the Tentative Specifications for Portland Cement (C150—40T), as revised, which will replace the Standard Specifications C 9 and C 74, covering Portland cement and high-early-strength Portland cement, respectively. Minor changes in the test for fineness by means of the turbidimeter (C 115) were mostly for clarification.

There has been a great deal of discussion in the society's Committee C-12 regarding specifications and tests for mortars for unit masonry. This has been a subject where strong opinions have been expressed on various points and the committee has reached agreement on tentative specifications for mortar for reinforced brick masonry. Two alternative specifications are covered as follows:

Properties Specifications in which the acceptability of the mortar is based on the properties of the ingredients (materials) and the properties (water retention and compressive strength) of the mortar mixture.

Proportion Specifications in which the acceptability of the mortar is based on the properties of the ingredients (materials) and a definite composition of the mortar consisting of fixed proportions of the ingredients. The purchaser is required to indicate under which of these specifications the mortar will be accepted.

Committee C-8 on Refractories, which has been extremely active in the past two or three years, recommended that the Society refer to ballot for adoption as standard 12 of its existing tentative standards. Some of these involve important tests; others provide quality specifications for various types of materials such as refractories for heavy-duty and moderate duty, stationary boiler service, incinerators, etc.

Committee C-14 on Glass and Glass Products submitted an important definition of the term "glass." In much of the A.S.T.M. work definitions occupy an important place and that is especially true when a relatively new committee is beginning active standardization work. The definition includes reference to certain classes of glass: one-component glasses, two-component glasses, and multi-component glasses, the latter including soda-lime-silica glasses, borosilicate glasses, and other special glasses.

It is indicated that glass is an inorganic product of fusion which has cooled to a rigid condition without crystallizing. Some glasses contain non-glassy material, always embedded in a glassy matrix. Glasses may be colored by suitable material in a dissolved or dispersed condition.

Messrs. Hughes and Anderson presented an interesting paper covering *The Effect of Fine Aggregate on the Durability of Mortars.*

The positive evidence from the investigation is that aggregates of either low absorption and low loss or of high absorption and high loss in the magnesium-sulphate test result in mortars of low resistance to natural weathering and to the slower laboratory freezing-and-thawing cycle. In other words, aggregates having an intermediate magnesium sulphate loss (about 20 per cent. for the aggregates and water-cement ratios of this investigation) may be expected to produce mortars of high resistance to freezing and thawing.

On the negative side, the compressive strength is shown to have no relation to the resistance to natural weathering or to the slow cycle of laboratory freezing and thawing when different aggregates and water-cement ratios of 5.07 and 6.76 gallons per sack are used. Also no relation between the laboratory cycles on the mortars and natural weathering was developed which would permit the use of either laboratory cycle as a control test for durability.

As a result of this and other investigations, the authors have become convinced that slow laboratory cycles are preferable to fast cycles and that until the differences between data from different freezing cycles, shapes and sizes of specimens, and criterion of resistance are explained, little progress will be made in developing durability control tests.

In *Properties of Limes and Lime-Mortars,* Professor H. R. Staley concluded that hydrated limes may be roughly classified as regards their plasticizing ability in a mortar, by an examination of the mixing-water requirements for a mortar of fixed sand-content and consistency. Six of the seven limes investigated could be classified on this premise: the higher the mixing-water requirement, the higher the plasticizing ability.

Relative sand-carrying capacities of the lime-hydrates were measured most accurately with an extrusion device. The void method presented checked the extrusion device most consistently.

Hydrated limes may be roughly classified as to their plasticizing ability in a mortar by sedimentation tests and the determination of the immobile-water factor.

A rough relationship is shown between the immobile-water factor and flow-after-suction. No apparent relationship is shown between the immobile-water factor and plasticity.

Is Creep Negligible When Concrete Is Loaded Under Ordinary Conditions?

By GABRIEL A. ASH*

ONE of the most interesting papers presented at the Concrete and Concrete Aggregates Session of the forty-fourth annual meeting of the American Society for Testing Materials, held in Chicago June 23 to 27, 1941, was that by Professor G. A. Maney of Northwestern University.

Professor Maney advanced the idea that "plastic flow or creep, which has been considered to be an inelastic time yield of concrete under load, is negligible when concrete is loaded under the low-stress conditions of ordinary practice."

His experiments show that what has for 30 years been considered an inelastic change due to the load, is an elastic change due to nonuniform shrinkage. The law of nonuniform shrinkage accounts for most of the excess time yield at ages under one year in loaded over unloaded cylinders, a change which has for so many years been called "creep" or "plastic flow." The results of Professor Maney's tests emphasize the fact that moisture loss "depends only on the humidity of the surrounding air and is

* *Consulting chemist, Brooklyn, N. Y., formerly known as "Gabriel A. Ashkenazi."*

not affected by loading." Thus, the phenomenon called "seepage" does not exist under working load.

This writer has to refrain from giving the details of Professor Maney's tests; the reader will find them published in the *Proceedings* of the A.S.T.M. It is sufficient to say here that his experiments were directed to prove the following:

1. The water loss is independent of load intensity.
2. The nonuniformity of water loss throughout the volume.
3. The flow is an elastic function of nonuniform shrinkage.
4. The existence of warping or nonuniform shrinkage.
5. The elastic nature of time yield.

At the beginning of his report Professor Maney mentioned that his theoretical considerations are leaning on the conception advanced by the French expert, E. Freyssinet. It is well known that, in the opinion of this scientist, shrinkage and creep are two aspects of the same phenomenon, and many experts agree that Freyssinet's theory of the structure of concrete comprises the most original, epoch-making views.

However, his theory does not account for some phenomena connected with the hydration of cement and the gel theory. Besides, his attempt to explain shrinkage and creep by the variations in the negative pressure of water contained in the capillaries of concrete met rather sharp and just criticism at the international meeting on The Chemistry of Cements, held in Stockholm in 1938.

Coming back to the paper by Professor Maney, this writer wishes to state that the tests and the obtained results are very interesting and convincing. However, this writer is not quite sure that Maney's conclusions ought to be generalized. Professor Davis of the University of California described a case of deformation and expressed his doubts whether it could be explained in accordance with an "elastic change." Of course it could not. As a matter of fact there are thousands cases of continuous deformation which occurs in concrete under a sustained load, contradicting Professor Maney's viewpoint. These deformations comprise a very complicated movement caused by many factors. One of them is certainly connected with an "elastic change;" the other, and perhaps a major factor, is the seepage of water through the gel. Yet, according to Professor Maney's experiments, "seepage" does not exist under working load.

It is known that seepage is affected by the amount of mixing water. This writer is not aware of the exact water/cement ratio of the mixture used for the preparation of the test specimens. However, he has been informed by Professor Maney that the minimum of mixing water has been used, an amount just sufficient to produce a workable mixture. Under such conditions it may be quite normal that water could not be "squeezed" out of loaded concrete, because it has been absorbed by the unhydrated particles of cement; it might have been absorbed by the existing cement gel, it also might remain moving in the pores and capillaries of the concrete. These possibilities may account for the absence of a loss of weight and for the "evidence of the non-existence of seepage." It would be of importance to repeat the same tests on specimens made with a greater amount of mixing water.

In the literature about time yields of concrete under sustained load there is mentioned a situation when creep ceased to exist under certain conditions. The writer is referring to the work by Probst. (*Structural Engineering*, December, 1931.)

Probst established that under the influence of rapidly alternating loading on concrete the specimens ceased to creep and have shown a *perfect elasticity*. In this case conditions were created when a limit to the creep has been reached. It is not excluded that, under the conditions of Professor Maney's experiments, a visible deformation, which we call creep, did not yet start.

In his conclusion Professor Maney is pointing out that some small amount of flow might exist under working load, but "it is quite evident that all important times yields under load, which have in the past been attributed by all investigators to 'plastic flow,' are merely elastic redistributions of stress and strain due to nonuniform shrinkage." This may be correct for the particular case presented in his paper, but this conception does not comply with numerous cases of deformation of concrete under working load. The writer wishes, however, to emphasize that the physical structure of set cement is still an open field for research and our conceptions of the movements in concrete "must be regarded only as a framework to be filled in and modified."

F. T. C. Hits Southern Lime Operators

The Federal Trade Commission has ordered 19 southern producers of lime and Hal S. Covert, of Knoxville, Tennessee, their former paid representative, to cease and desist from engaging in a combination or conspiracy to maintain a delivered-price system for their products.

The respondent producers are:

Pine Hill Lime & Stone Company, Pine Hill, Kentucky.

Southern States Lime Corporation, Charleston, South Carolina and Crab Orchard, Tennessee.

Gager Lime Manufacturing Company, Chattanooga and Sherwood, Tennessee.

Knoxville Lime Manufacturing Company, Knoxville, Tennessee.

Longview-Saginaw Lime Works, Inc., Birmingham, Long View, and Saginaw, Alabama.

Cheney Lime & Cement Company, Birmingham, Landmark, and Greystone, Alabama.

Ladd Lime & Stone Company, Cartersville, Georgia.

Virginia Lime Products Company, Inc., Eagle Rock, Virginia.

Kimbalton Lime Company, Inc., Shawsville, Virginia.

Eagle Rock Lime Company, Eagle Rock, Virginia.

Williams Lime Manufacturing Company, Knoxville, Tennessee.

Florida Lime Products Company, Inc., Ocala, Florida.

Dixie Lime Products Company, Ocala, Florida.

Keystone Lime Works, Inc., Keystone, Alabama.

M. J. Grove Lime Company, Lime Kiln, Bonsville and Frederick, Maryland and Stevensville, Virginia.

Ripplemead Lime Company, Inc., Ripplemead, Virginia.

Riverton Lime & Stone Company, Riverton, Virginia.

Jesse Allen Lime Company, Burns, Tennessee.

George L. Scott, Sr., trading as Alabaster Lime Company, Siluria, Alabama.

The commission's findings are that the respondents produce a majority of the agricultural, structural and chemical lime manufactured in the southeastern states (east of the Mississipi and south of the Ohio and Potomac Rivers), but somewhat less than a majority of the lime sold in that region.

Its findings are that the respondents' system of identical delivered prices was based on the use of a number of so-called basing points whereby all the delivered prices were calculated as though shipments were made by railway from a single basing point or from points having a common or the same freight rate to the respective destination or destinations.

The commission's order directs that the respondent producers, directly or through the respondent Hal S. Covert,

cease and desist from continuing or carrying out any agreement, understanding, combination or conspiracy between and among themselves or with others, for the purpose of restraining, monopolizing, or eliminating competition in the purchase or sale of lime and from performing by concerted action or agreement the following practices:

"(1) Fixing, establishing, quoting, or maintaining delivered prices to any given point of delivery, predicated upon the use of basing points, by the use of which all delivered price quotations are calculated as though shipments are made by rail from a single point or points having a common freight rate to destination.

"(2) Filing or exchanging among themselves or with others the base prices applicable to the respective basing points, and adhering or agreeing to adhere to specific basing points and specific basing-point prices.

"(3) Making quotations and sales of their products upon a delivered basis only, with freight equalized from their respective shipping points, wherever the cost of their products to any given buyer, when delivered from any point, is thereby made identical at any given destination, regardless of variations in freight from different places of production and shipment.

"(4) Promising to adhere to, and, pursuant to any promise, assurance or understanding, adhering to filed prices, terms and conditions of sale in the making of quotations or sales of their products.

"(5) Fixing or establishing prices, terms and conditions for the sale of lime to the public, and fixing or maintaining uniform prices, terms and sale conditions.

"(6) Compiling and circulating among themselves or others, lists of freight rates from various basing points to various destinations in order to insure that differences in the actual freight from actual shipping points to a given destination and differences in the interpretation and application of freight tariffs will not create differences in the delivered price at any given destination.

"(7) Submitting identical delivered price quotations, terms and conditions of sale in sealed bids or other bids on invitations from municipalites, state or federal governments, or refusing to quote other than delivered prices or their equivalent in making such bids.

"(8) Entering into, participating in or carrying on, through the respondent Hal S. Covert, or under his auspices or direction, or through any central agency, meetings, or otherwise, discussions and exchanges of information concerning proposed or future prices, terms and conditions of sale.

"(9) Fixing or increasing the price to be charged for delivery in carload lots of less than 15 tons as compared with the price for larger carloads by adding thereto a uniform premium or surcharge.

"(10) Collaborating or exchanging price information with lime producers' trade associations in other areas whose members sell lime in the respondents' territory, for the purpose and with the effect of restricting competition as to prices, terms and sale conditions in the respondents' territory.

"(11) Collaborating or exchanging price information with trade associations composed of lime producers located in other sections for the purpose and with the effect of recognizing, adopting, or selling the respondents' lime products according to delivered-price quotations prevailing in other sections than the respondents' territory when offering for sale or selling their products in such 'outside' territory and thereby restricting price competition in such 'outside' territory.

"(12) Exchanging information as to basing-point price quotations, freight rates from basing points, and delivered price quotations with trade associations composed of lime producers located in other sections for the purpose or with the effect of inducing reciprocal adherence to the delivered-price quotations prevailing in the respective districts.

"(13) Determining what concerns shall be recognized as dealers and jobbers and thereby entitled to purchase lime at jobbers' and dealers' prices, terms and conditions of sale, or compiling or circulating lists of such recognized jobbers and dealers.

"(14) Establishing or allowing uniform discounts, commissions or compensation to their respective dealers when bidding upon the requirements of municipalities, state or federal governments or other large consumers, or establishing or allowing a uniform differential between the price to dealers and the price to contractors.

"(15) Exchanging among themselves or with their dealer customers, in advance of the submission and opening of sealed bids on federal, state and municipal requirements for lime products, the prices which they propose to quote in such bids.

"(16) Fixing, establishing or maintaining prices to be quoted by their dealer customers when bidding on lime to be purchased by municipalities, State or Federal governments or other large consumers.

"(17) Employing the respondent Hal S. Covert or any other person, partnership or corporation, to act as an agency for putting into effect or carrying out, directly or indirectly, any of the policies, rules, practices or methods of competition prohibited by the commission order; or adopting or taking any other concerted or coöperative action to carry out or make effective the acts and things prohibited by the order."

The commission dismissed the proceeding as to the respondent Green Bag Cement Company of West Virginia, Kenova, West Virginia, because of insufficient evidence.

Sweden Expropriates All Stocks of Cement

All stocks of cement for building and construction purposes owned by private persons, cement-manufacturing firms, or sales organizations operated by a number of manufacturers for the sale of cement were expropriated by the Swedish Government on April 8, 1941. In addition, all stocks of cement that after April 7 have been manufactured in or imported into Sweden for other than government account also were expropriated. Lots of cement for which an export license was obtained prior to April 8 are exempt from the expropriation.

Normally the cement industry in Sweden consumes large quantities of coal. Because of the coal shortage the government expropriated coal as of April 7, and to prevent undue curtailment of cement output a substitute for cement (cement Class E) will be marketed. Considerably less coal is required in manufacturing this substitute than in the manufacture of Portland cement, and it is suitable for most building and constructional work, including foundations, walls, yards, concrete pipe, and similar construction. Therefore, future cement manufactures will comprise some Portland cement (Class A and Class Special) and some cement substitute that satisfies the government standard for durability equalling that of manufactured Portland cement Class B but differing in chemical composition from standard Portland cement. In the future Portland cement may be obtained only for particular and important purposes (such as military use) for which a substitute cannot be used.

Effective April 7 all persons or firms having expropriated stocks are obliged to declare them to the State Industrial Commission not later than April 15. Cement imported into Sweden after April 7 also must be declared to the Commission not later than 7 days after arrival.

Hereafter manufacturers and owners of expropriated stocks of cement must report to the Commission on a special form, not later than the seventh day of each month, the quantity of cement manufactured, purchased, sold and used.

HANDLING SAND INTRAPLANT BY GRAVITY

This view of the Decker's Creek plant shows why gravity is ideally suited to the handling of materials. Trestle from quarry at right.

Two of the three towers from which the sand is stock-piled. The crane loads open-top cars.

Looking down on the counter-current classifier and the 54-inch by 20-foot screw used in the classification of glass sand.

THAT being a pioneer in an industry does not necessarily keep a company from being as alert and progressive as younger competitors is evident from the history and present operations of the Decker's Creek Sand Company at Greer, West Virginia. This company opened its first plant near that place about 39 years ago. In 1919 a new deposit was developed at Greer, 11 miles east of Morgantown, and the plant was moved to this location. In 1926 the present plant was built. Many improvements have been made since that time to keep it in the front rank of the industrial-sand industry. Perhaps the most interesting feature of this operation is the fact that all the handling of material in the plant is done by gravity. The products of this plant are glass sand, traction sand, blast sand and some building and filter sand. The plant's capacity is about 50 tons per hour.

In 1924 all the loading in the quarry was done by hand and the plant equipment consisted of a crusher, a wet pan and four screw-washers. The new mill in 1926 had a 24- by 36-inch primary jaw crusher, 12- by 20-inch secondary jaw crusher, a 9-foot wet pan, ten 30-inch screw-washers, and a revolving screen. A hoist and cars hauled the rock from the quarry, where loading was done by a ¾-cubic yard steam shovel. A drag-line scraper system was then used for removing the overburden. The following description of the present operations shows the improvement that has since been made.

Since 1924 the sandstone for the plant has been obtained from the quarry near the plant. A 4-ton gasoline locomotive and fifty 4-ton cars were used to haul the stone downgrade to the plant. Another quarry, about ½ mile from the plant, is now being opened. This is in the same ledge of Pottsville series conglomerate of high-grade silica sand. A fleet of five new International trucks with 4-ton Truck Engineering Company dump bodies has been purchased. These will haul the stone to the plant over a 20-foot-wide, crushed-limestone-base, traffic-bound road which was built by a contractor and is inclined downward most of the way to the plant. The same Bucyrus-Erie 1-cubic yard electric shovel and Marion 450 gas-electric shovel will be used in the new quarry. The overburden is being removed by a Caterpillar 60 tractor with a La Plante-Choate bulldozer.

By W. E. TRAUFFER

Some of the trucks assembled in the quarry.

Until two years ago the 60-foot face of the quarry was drilled in benches with jackhammers. An 18-foot by 8-foot bench was first shot out of the top of the face. Then holes were drilled down 18 feet deep from this bench and snake-holes were drilled back 18 feet from the toe of the face. These holes were then sprung twice and later detonated simultaneously.

The rod-mill scrubber and partial view of the four screw-washers which precede it in the flow.

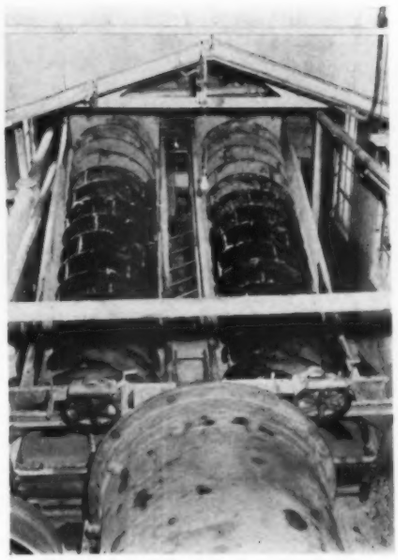
Very good breakage and tonnage were obtained.

Two years ago, in an effort to simplify the drilling and blasting operations, a Cleveland WD 14 wagon-drill was purchased and wet holes are now successfully drilled the full height of the face. At first 1¼-inch steel with ordinary sleeves was used, but there was considerable steel breakage and the holes rifled badly. A change to 1½-inch steel eliminated the breakage and the greater flow of water through the larger steel has eliminated the rifling.

Timken detachable bits are used and about 10 feet of hole is drilled before the bits are re-sharpened. After two re-sharpenings the bits are discarded. Three-inch bits are used at the tops of the holes and ⅛-inch reductions are made every 10 feet. At the bottoms of the holes 2½-inch bits are used.

In loading the drill holes 8 feet of 1¾-inch sticks of duPont 50-per cent. gelatin are placed in the bottom of the 60-foot hole. Higher up in the hole du Pont Gelex No. 2 (40-per cent. semi-gelatin) is used. Electric exploders are used and these are detonated from the high-tension power line. The total explosives cost is 8 cents per ton, including secondary shooting. Secondary drilling is done with Gardner Denver jack-hammers. The air used for drilling and other purposes is supplied by a Sullivan 14- and 8¾- by 10-inch angle-compound compressor.

At the plant the stone is dumped from a trestle into a 28- by 36-inch Traylor jaw crusher followed by a 12- by 20-inch secondary jaw crusher. The crushed sandstone drops into a 9-foot-diameter Lewistown wet pan from



Rod-mill in foreground used to scrub the sand, and the two screw-classifiers which serve as washers.

which the material is split to two pairs of 30-inch by 12-foot Lewistown screw-washers. The sand and water from these screws go to a 5- by 10-foot Marcy rod-mill which has a comparatively light load and is used as a scrubber. The mill discharges by gravity into two 48-inch by 20-foot Colorado Iron Works "Akins" SDPH Type 1 screw-classifiers which also act as washers. These classifiers have ½-inch perforated plates 6 feet long near the middle of their length on the side on which the sand is raised by the screws. Water is introduced through these perforations at 18-pound pressure, causing the sand to "boil." Light particles of material flow through the center of the band screw flights and overflow at the feed end of the classifier.

The dewatered sand is discharged from the two screws over two sets of two 4- by 5-foot Tyler Hum-mer single-deck screens arranged in tandem. All four of the screens are equipped with 20-mesh Monel-wire cloth. The plus

These three views show how sand is loaded into box cars by the use of a special hopper which rests on the top of the car. The sloping chute feeds the material to a loader inside the car. The picture on the extreme right shows the crane swinging the loader around to the far side of the car preparatory to placing it inside.

20-mesh sand passing over these screens goes to a revolving screen with 10-mesh openings. The plus 10-mesh pea gravel passing over this screen is flumed to one of the three loading stock-piles at the foot of the hill. The 20- to 10-mesh sand falling through the screen flows into a 6-foot Allen cone from which it is flumed to another stock-pile as traction sand.

The minus 20-mesh sand dropping through the Hum-mer screens goes to a 54-inch by 20-foot Akins screw-classifier. The product of this classifier goes into a 4- by 10-foot Hardinge countercurrent classifier for further cleaning and is then discharged into two 6-foot Allen cones. The dewatered sand from these cones is flumed to another loading stock-pile as glass sand.

By changing screen sizes and making other adjustments sand can be produced to meet any specifications. There is

Two of the sand classifiers and dewaterers from which the sand is discharged through pipe-lines to open storage.

also a small auxiliary plant which can be used to grind pea gravel and classify it to make any desired type of sand. This plant is ordinarily used to make filter sand on special order. The equipment, in flow-sheet order, consists of two 20-inch Lewistown screw-washers, two 4- by 5-foot Tyler Hum-mer screens, a 4- by 8-foot Hardinge rod-mill, and two more 4- by 5-foot Hummer screens. One of the above-mentioned three stock-piles is used on the rare occasions when this plant is used.

These materials are fed by gravity to these stock-piles through three 1300-foot lines of 6-inch vitrified-clay bell-and-spigot tile. Clear water is introduced in these lines and each line terminates at a 30-inch Lewistown screw-dewaterer on a steel tower over one of the three stock-piles. From these screws the three grades of sand drop on the stock-piles which have a combined capacity of about 20,000 tons. There is a flat concrete floor under the stock-piles and up the side of the hill as far as the stock-

Standing, left to right: N. D. Shafer, superintendent; L. E. Summers, quarry foreman; J. M. Strouss, vice-president and general manager. Excavator operators H. L. Rodgers and D. H. Summers on shovel.

piles extend. The flat section of floor is about on the same level as the tops of the railroad cars on the loading siding.

A Bucyrus-Erie 1-cubic yard clamshell crane is used to load open-top cars. An interesting method has been developed for loading box cars. A special 4-cubic yard steel hopper is moved into place by the crane. This hopper has the usual two legs on one side which rest on the floor. On the other side are two horizontal steel arms which rest on a protective timber on the top of the box car. A sloping chute feeds the sand inside the car to a Stephens-Adamson Sinden box-car loader. After the hopper has been put in place the crane swings the loader around to the far side of the car and in the open door.

The water for these operations is secured from Decker's Creek at the bottom of the hill below the loading level. A 4-stage Weinman centrifugal pump feeds about 400 gallons of water per minute against a 600-foot vertical head into a reservoir near the top of the hill. From this reservoir water is fed by gravity to the plant at the rate of about 1,400 gallons per minute. All the overflow from the equipment in the plant goes into two tanks, which settle out much of the suspended sand and other material. A Warren 1,200-g.p.m. pump feeds the water against a 125-foot vertical head into a Dorr 85-foot-diameter traction thickener. The clear water overflowing the thickener is returned by gravity to the reservoir. In this way little water is wasted and most of that is used in the pipes to the loading piles.

The new quarry floor is 2,100 feet above sea-level, the plant office and thickener are at 2,000 feet, the main part of the mill is at 1.900 feet, the storage and loading yard is at 1,500 feet and the creek is at the 1,400-foot level. These figures show why it is possible to do all the material handling by gravity at this plant. Men and materials are raised and lowered between the plant and the loading yard on a car operated by a hoist and cable.

The officers of the Decker's Creek Sand Company are: J. M. G. Brown, president; J. M. Strouss, vice-president and general manager; Della Strouss, secretary and treasurer. N. D. Shafer is superintendent.

Pebble Imports Halt; Find Domestic Supply

Because of curtailed imports of items in the classification "flints, flints and flintstones, unground," which include French and Danish flint pebbles for grinding and ceramic purposes and Belgian silex, foreign pebbles are now being replaced largely by material produced domestically, the Bureau of Mines reports.

After the fall of France no imports of these materials were obtained from Europe, except one ton shipped from the United Kingdom. Total imports during the first 6 months of 1940 amounted to 1,877 short tons having a foreign value of $24,530 compared with the total imports in 1939 (12 months) of 11,987 short tons. During the second half of 1940 virtually all of the imports, aggregating 963 short tons worth $7,867, were from Newfoundland.

Efforts to find some nearby sources of suitable substitutes for imported pebbles and liners appear to have been successful. One large importing firm, after having investigated possible deposits in the United States, Canada, and Newfoundland, now supplies its former users of French and Danish pebbles and Belgian silex with granite grinding cubes and lining blocks and silica quartz pebbles from North Carolina or grinding pebbles from Newfoundland, depending upon the type of material to be ground. The gathering of grinding pebbles was begun in the Manuels area of Newfoundland in 1940. The pebbles, picked up from the beaches, ranged in diameter from 1 to 5 inches. It was estimated that by December 1 about 1,000 tons had been gathered, most of which were shipped to the United States.

A domestic true flint pebble also has been tested. The North Carolina cubes, which are tumbled to remove edges, are tougher than the formerly imported product and contain somewhat more iron. Because of their greater durability, however, no more iron is released into the mill than formerly. Most of the quartz pebbles being marketed are not as tough as the foreign pebbles by about 30 per cent. but contain only about 0.005 per cent. iron and have a silica content of more than 99 per cent.

Performance Measurement and Mechanical Control

Part VI

By ROBERT W. ROTHROCK, Ph.D.

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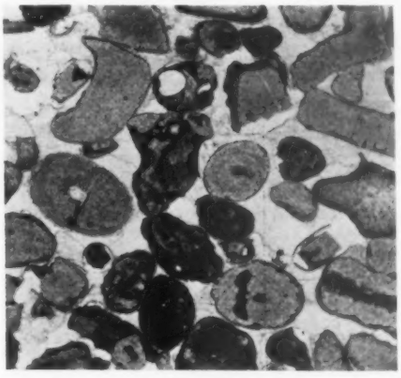
OF all the nonmetallic minerals utilized in quantity commercially, lime has probably the most diversified uses. These may, however, be grouped into three general applicational divisions.

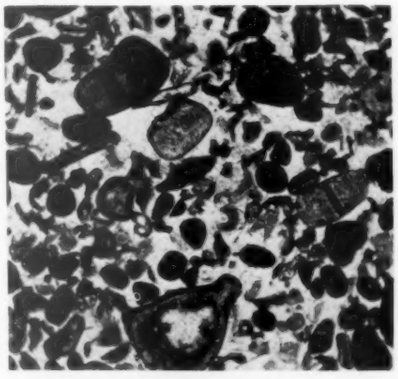
(1) Lime is a building material. It has been used in plaster and mortar apparently since the beginning of recorded time.

(2) Lime is a low-priced chemical compound. It enters into many chemical process reactions in numerous large-volume industries.

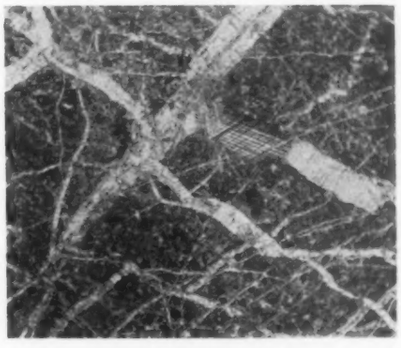
(3) Lime is a soil amending material. Here it is used not only because of its neutralizing chemical action on acid soils but also for its physical action to improve the physical characteristics of various soils.



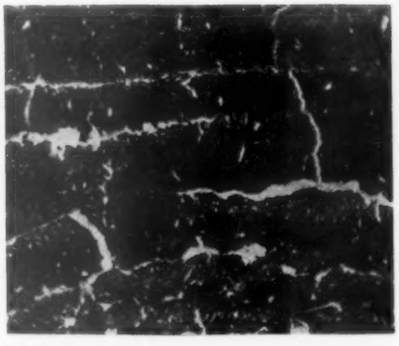
INDIANA



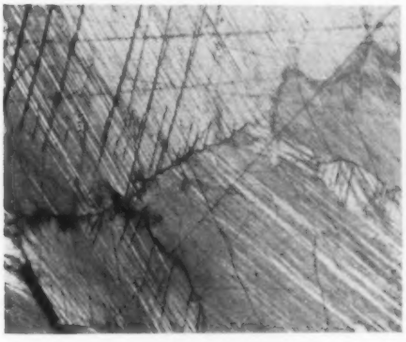
MISSOURI



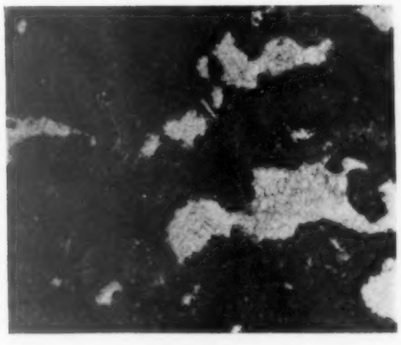
BRITISH COLUMBIA



PENNSYLVANIA



CALIFORNIA



VIRGINIA

Figure 1—Photomicrographs of six limestones in thin section, illustrating some differences in physical structure which make variations in control of burning necessary.

Just any lime will not satisfy the many varied requirements in the three groups although, when properly burned, many limes can be made to serve satisfactorily in a number of different applications.

Differing from cement production, where the manufacturer has some opportunity to select and proportion the raw materials to produce the results required, the lime manufacturer unfortunately must use the raw material unaltered as nature provides it. At the same time, in a general way he is desirous of making a product that will meet a variety of competitive market demands.

Lime Burning Requires Diligent Control.—Lime may be defined as the product remaining after the removal of carbon dioxide from limestone. Limestone of commercial-lime value occurs in nature composed principally of calcium carbonate, and as calcium carbonate with varying amounts of magnesium carbonate up to approximately 46 per cent., at which point the limestone is known as dolomite. Along with these constituents there are present small amounts of impurities usually in the form of silica, iron and alumina compounds. Thus, it is seen that limestone contains in itself the components that were shown, in earlier parts of this series of articles, to be constituents in the production of Portland cement. Even though some of them are present in very small proportions they are nevertheless capable of forming the same minerals as are formed in cement. Therefore, one problem of control which presents itself to the lime burner is to manipulate the burning in a manner to remove the carbon dioxide and at the same time prevent the formation of minerals which lend hydraulic and dead-burned characteristics to the resulting lime.

The lime burner is also confronted with the problem not only of those

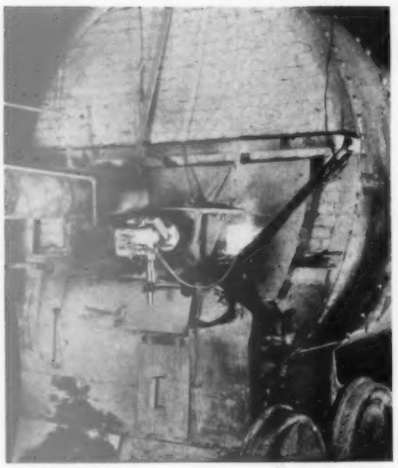


Figure 2—Radiation pyrometer applied to determine burning-zone temperature of a rotary kiln.

variations in the control of the burning procedure made necessary by differences in chemical constitution but also those made necessary by differences in the physical structure of limestones. Observe Figure 1 which shows photomicrographs of limestones in thin section. All were above 99 per cent. in calcium carbonate. These illustrate some differences in physical structure which have been found to be just as important as differences in chemical constituents in making it necessary for the individual lime manufacturer, in some manner or another, to control the burning procedure accurately if the finished product is to be the best that may be obtained from the particular limestone available to him.

Along with this, economy of production is also a problem. Among the factors affecting economy, the life of kiln liners is an important one. Kiln liners are usually made of refractory materials which may form compatible melts with lime and the impurities in lime. Accordingly at high temperatures a fusion of limestone and lime to the kiln walls can and does take place. "Hang ups" due to such fusions are not infrequent in vertical-kiln practice and, similarly, they contribute to the formation of rings in rotary kilns. Both formations are destructive of kiln liners and, while they may not be entirely avoided, their occurrence may be less frequent when temperatures are known definitely and comparatively by the aid of measuring devices rather than by depending upon the human eye alone for estimating kiln conditions.

Burning or calcination in the lime industry has, as indicated, for its purpose the separation of the carbonates into oxide (quick lime) and carbon dioxide. There is a minimum temperature below which this separation will not occur; there is a maximum percentage loss of carbon dioxide (loss in weight) that can not be exceeded at any temperature or time-period of burning, even though calcination does proceed more rapidly at higher temperatures.

Temperature at Which Carbon Dioxide May Be Driven Off.—The minimum temperature at which carbon dioxide may be driven off in practical measurable quantities is approximately 1,650 degrees F. for calcium carbonate and 1,380 degrees F. for magnesium carbonate. These temperatures are commonly called the "dissociation temperatures". However, calcination at these temperatures proceeds too slowly to be economical practically, and since calcination proceeds more rapidly at higher temperatures higher temperatures are used, the usual range being from about 1,800 up to 2,400 degrees F., depending upon the chemical constitution and the physical structure of the limestone itself, as well as on the physical properties desired in the calcined product.

Experimentally it has been shown * that, when heat is applied to limestone a rise in temperature advances into the stone more rapidly than calcination occurs. The temperature of the center of the piece of stone approaches, but does not become equal to that of the outside surfaces prior to the driving off of carbon dioxide at the center. Calcination proceeds from the outside to the inside and, as it does so, the resistance to heat transfer toward the center is increased.

Therefore, it is not only necessary to heat limestone to the temperature at which carbon dioxide will be liberated, but the burning also requires that the limestone be held at that temperature sufficiently long so that calcination proceeds to the center and liberates carbon dioxide completely throughout the particle of stone.

Thus, as in every other industrial chemical process where heat is involved, accurate control of lime burning is essential. Temperature measuring devices and other instruments properly applied can be of material aid in this control since there is usually one set of temperature *versus* time conditions under which the best over-all results are obtained.

Instruments Have Proved Their Value.—Some effects of instrument control may be exemplified by citing the problem of one western manufacturer using a rotary kiln with oil as fuel. The limestone contained magnesium up to 25 per cent. The magnesium was present as a complex mixture of magnesium carbonate and magnesium silicate along with traces of silica, iron and alumina. This stone was so intermixed in the quarry in about equal parts with a very nearly pure calcium carbonate that separation was too difficult to be practical. The stone high in impurities not only discolored badly but tended to lend hydraulic properties to the finished lime, except when burned under a very definite time-temperature schedule. The production of a uniformly satisfactory lime seemed almost impossible, yet with the installation of a thermocouple pyrometer at the stack end and at the hood a radiation pyrometer (a type of which is illustrated in Figure 2 by courtesy of the Bristol Company) a kiln temperature and heat distribution was maintained such as would produce a white lime product even with inexperienced operators.

In another instance the raw limestone of a southern quarry contained traces of sulphur and manganese. When this stone was burned on the basis of 4-hour draws, in natural-gas fired vertical kilns at 1,950 degrees F. and cooled rapidly, the product was white. However, when burned at temperatures below 1,950 degrees F., or when cooled slowly from a higher temperature, the product was brick-red in color. Measuring devices which enabled the kiln operator to maintain definite temperature and kiln-pressure conditions were major factors finally utilized to produce a saleable product.

It is apparent that the production of lime requires that the kiln operator perform certain functions at specified times or intervals. In consideration of this it is important for management to know whether or not proper schedules are followed, not only to avoid impairment of the product but to prolong refractory life and otherwise effect economy in operation. Although measuring devices are not widely used in the lime industry, the practicability of instruments for control has been proved in this industry and will be illustrated through discussions of the results obtained in applications.

* Thesis—Burning Characteristics of Limestone—Robert W. Rothrock, Ohio State University, 1931.
C. C. Furnace—The Rate of Calcination of Limestone, U. S. Department of Commerce—Bureau of Mines Bulletin, 1931.

Cement Companies Get U. S. Cement Contracts

The Oklahoma Portland Cement Company, Ada, Oklahoma, has been awarded a contract for $87,500 for cement for the bomber-assembly plant at Tulsa.

The Dewey Portland Cement Company, Kansas City, Missouri, received a contract for $133,500 worth of cement for the same project.

The plant as seen from the Appomattox River dock. Gravel-loading conveyor at left; flume to sand classifier, right.

New Plant Rushed to Completion to Supply Urgent Defense Need

THE defense program has virtually every industry straining to produce enough material to keep it from being a "bottle-neck," and the sand-and-gravel industry is no exception. The middle Atlantic states have been particularly affected by this demand because of the tremendous expansion in war industries, shipbuilding, etc., and the many army camps built or enlarged in this area. Southeastern Virginia has had its share of this expansion and a number of new plants have been built to meet the demand for aggregates. Many other plants have been enlarged and improved.

One of the new plants is that of the Friend Sand & Gravel Company near Petersburg, Virginia. This 150-ton per hour sand-and-gravel plant was put in operation on March 4, 1941 and is being operated 9½ hours per day to keep up with defense demands. Because of these urgent requirements the plant was put in operation before it was completed according to the original plans. Later such refinements as a raw-material surge stock-pile will be added. All the shipments from this plant are made in barges.

The parent concern, Friend & Company, was formed in 1868 to deal in building materials in Petersburg. In 1927 the Friend Sand & Gravel Company was organized to produce sand and gravel. A bucket-ladder dredge with screens was used until 1936 when the river deposit was exhausted. A 75-ton per hour land plant was then operated near Petersburg until late in 1940, when this deposit also was exhausted.

The new plant is on the Appomattox River about 5 miles east of Petersburg and the deposit lies a few thousand feet inland. The 210-acre deposit is alluvial and averages 14 feet in depth. About 20 per cent. of the gravel is over 2 inches in size and contains some large bowlders. About 20 per cent. of the material is from 1 to 2 inches in size, 15 per cent. is from ¼ to 1 inch, and 45 per cent. is sand. There is very little clay or soft stone and the products meet all the tests for concrete aggregates.

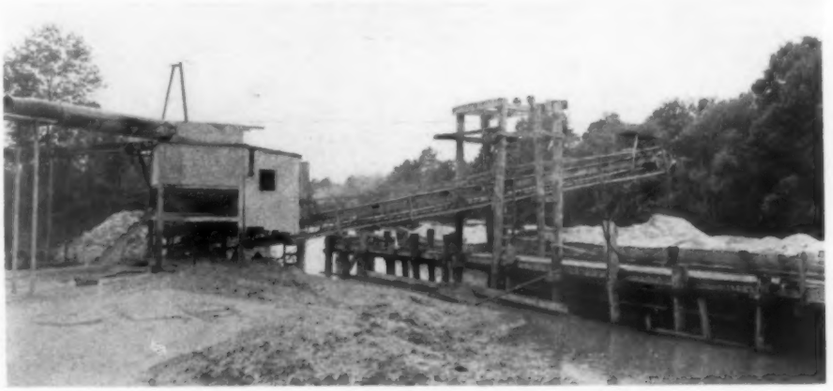
The overburden is very light and is stripped only because of the roots of trees which had to be cleared from the deposit. The excavating and loading are done by Osgood and Thew Lorain drag-lines, both gasoline-engine-powered and equipped with 1-cubic yard Page drag-line buckets. The material is hauled about ½ mile to the plant by a fleet of eight Ford V8 trucks equipped with 4-cubic yard Gar Wood bodies. The trucks dump the material from a fill on a 6-inch rail grizzly. Any oversize bowlders are thrown into 1-cubic yard Dempster Dumpster buckets which are hauled away when full by a Dempster-equipped Ford truck.

The material passing through the grizzly goes into a small steel hopper. A Tyler electric vibrator insures a steady supply of the material to a 30-inch by 100-foot Barber-Greene belt-conveyor which feeds a 4- by 18-foot revolving screen that serves primarily as a washer. The main barrel is equipped with 2-inch openings and the outer jacket with ¼-inch-perforated plates which remove the sand. All the gravel goes on a 20-inch by 60-foot belt-conveyor to a 4- by 10-foot Telsmith 3-deck vibrating screen. This is usually equipped to produce three sizes of gravel and sand. The gravel retained on the top deck can be chuted into a 12- by 24-inch Good Roads jaw crusher.

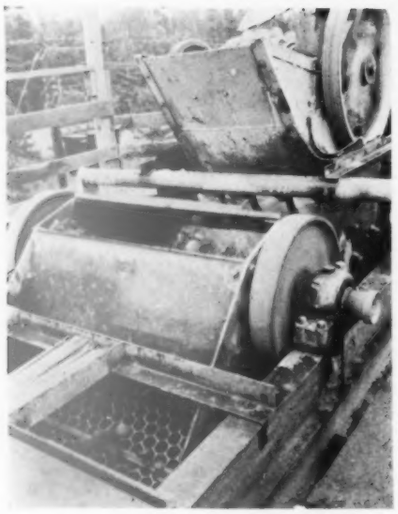
Drag-line loading one of the fleet of eight 4-cubic yard trucks.

If the next smallest size is also to be reduced, it is chuted into a 3-foot Telsmith Gyrasphere crusher. The products of both crushers are discharged on a 24-inch by 82-foot Barber-Greene belt-conveyor which returns them to the revolving screen.

The three finished sizes of gravel



Sand tank with flume from plant at left. Barge-loading conveyor at right.



All the sizing is accomplished on this 3-deck screen.

from the vibrating screen are stored in the three 48-cubic yard compartments of a wooden bin. Under the bin is a 24-inch by 162-foot belt-conveyor on which the gravel is withdrawn and discharged over a 2- by 6-foot Robins rinsing screen into barges.

The sand and water from the revolving screen and the vibrating sizing screen go through a common flume into a large steel settling tank of the simple overflow type. This tank is 10 feet wide and 12 feet long and has an inverted

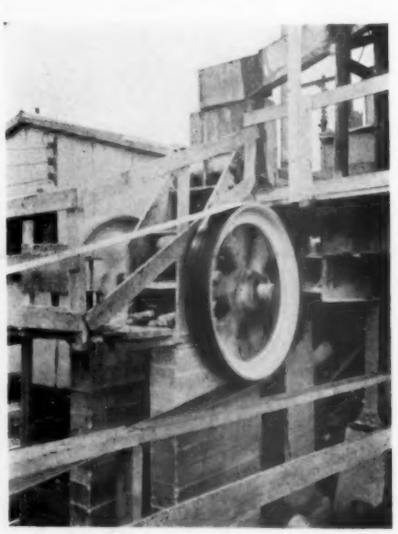
Dump truck at plant hopper. Oversize bowlders are thrown into detachable truck-buckets below.

pyramid bottom similar to an ordinary truck-loading hopper. Two Tyler electric vibrators on the bottom of the tank keep the settled and dewatered sand flowing steadily to a 24-inch by 60-foot Barber-Greene conveyor, which loads it into barges. These vibrators keep the material on the sides of the tank moving freely and prevent the building up of a cone which would be flushed out.

The barges are tied up for loading at a long wooden dock on a dredged channel or tidal basin off the main channel of the Appomattox River. The company owns eleven 350-ton barges and two tugboats, one powered with a 25-horsepower Cummins Diesel engine and the other with a 30-horsepower Fairbanks-Morse Diesel engine. These barges are unloaded at the company's Petersburg yard by two locomotive cranes, an Orton and a McMyler. All highway and railway shipments are made from this yard. Most of this material is used for state highway work. There are also facilities for loading four Jaeger 2-cubic yard truck-mixers operated by the parent company. Whenever there is an excess of any size of material it is stock-piled, by means of a derrick boat, on the bank of the river near Petersburg.

Much of the material for defense construction work is shipped in 500-ton barges belonging to contractors who hire tugs to tow them to Camp Lee, Fort Storey, the Naval Ammunition Depot at Norfolk, etc.

Spherical-head crusher used to reduce smaller gravel sizes.



The large gravel is broken by this jaw-crusher.

The plant was originally operated entirely with Diesel power because electric-power lines had not yet been installed. Now the two crushers and the 2,500-gallon per minute Goulds water pump are driven by 100-horsepower electric motors. A Cummins 50-kilowatt Diesel-generator set supplies current for the motors driving the belt-conveyors and screens. Goodyear belting is used on most of the conveyors.

Resinous Admixtures Reduce Surface Scale

Reduction of surface scale in concrete highways may be accomplished by the use of a resin derived from pine-wood, according to the Hercules Powder Company. Additions of small amounts of this product, Vinsol resin, by the cement manufacturer to the clinker during grinding almost completely eliminate surface scale and greatly reduce progressive scale, the company says. Improved workability is also reported by contractors who have used the resin-treated cement in large-scale field tests.

Laboratory and field tests conducted by state highway departments and cement companies show that additions of up to .05 per cent. of the resin to cement are sufficient to reduce scale produced by freezing and thawing.

Scaling of highways in many states has been greatly increased in recent years by the use of chemical compounds, usually chlorides, to remove ice. Alternate freezing and thawing so rapidly deteriorates cement highways that many states have expended great effort to find a solution for this serious problem.

Tests conducted by leading cement companies, the New York Department of Public Works, and test roads in other states established the fact that minute amounts of fat, oil, or oleoresinous materials reduced scaling. Further tests compared the scale resistance of standard Portland cement, coarse ground Portland, Portland plus natural cement mixed 6:1 by volume, Portland plus 0.05 per cent. fish-oil stearate ground in at the cement mill, and Portland plus 0.05 per cent. Vinsol resin ground in at the mill.

One of the leading cement companies constructed an experimental road in New York state consisting of 20-foot lengths separated by dummy joints, each length consisting of one type of concrete. Duplicate lengths of each concrete type were used, one length constructed of a good sand, the other of a poor sand. Dikes built around the sections held water which was added to each slab. Whenever freezing occurred, the ice was melted with two pounds of calcium chloride flake per square yard of surface.

(Continued on page 54)

RECLAIMING LIME IN WATER SOFTENING

By JOHN H. D. BLANKE

THE Metropolitan Water District of Southern California delivers water to its 13 member cities from the Colorado River at Parker, Arizona, through 242 miles of 16-foot diameter aqueduct having an ultimate capacity of one billion gallons per day and equipped with 5 huge pumping stations which lift the water an aggregate of 1,617 feet before it enters the 150 miles of gravity distribution system. As a part of the distribution system the District has constructed, 35 miles northeast of Los Angeles, a lime-zeolite water-softening and filtration plant having an initial capacity of 100 million gallons per day and an ultimate capacity of 400 million gallons per day. The principal units of this plant, in their order, consist of flocculators, clarifiers, rapid sand filters, and zeolite softeners.

The average analysis of Colorado River water, in parts per million, is as follows: 81.0 calcium, 25.0 magnesium, 87.0 sodium and potassium, 182.0 bicarbonate, 243.0 sulphate, 60.0 chloride, 2.8 nitrate, 0.25 iron, 19.0 silica, 0.3 fluorine, 0.15 boron, 609 total dissolved solids. The hardness at $CaCO_3$ is 305, of which 145 is carbonate and 160 is non-carbonate. Free carbon dioxide is 6 parts per million, and the hydrogen-ion concentration (pH) is 8.0.

The hardness of the aqueduct water is due primarily to three compounds held in solution, namely: calcium bicarbonate, which causes the carbonate hardness, and calcium and magnesium sulphates, which cause the non-carbonate hardness.

The calcium-bicarbonate ($CaCO_3$) hardness of the water is reduced by adding lime (CaO) or dissolved limestone to the water, resulting in the deposit of insoluble limestone ($2CaCO_3$) as a sludge on the bottom of the clarifier, the reaction being $CaCO_3{\cdot}CO_2 + CaO = 2CaCO_3$.

The non-carbonate hardness is reduced by a zeolite base exchange, the zeolite absorbing the calcium and magnesium in exchange for the sodium, this hardness being removed later by means of sodium chloride. The reactions in this case are: $CaSO_4 + Na_2Z = Na_2SO_4 + CaZ$ and $MgSO_4 + Na_2Z = Na_2SO_4 + MgZ$. Stated differently, the hardness-forming calcium sulphate ($CaSO_4$) and magnesium sulphate ($MgSO_4$) plus sodium zeolite (Na_2Z) equals the non-hardness form of sodium sulphate (Na_2SO_4) plus the calcium zeolite (CaZ) and magnesium zeolite (MgZ) on exhaustion. The zeolite regenerating reactions are as follows: $CaZ + 4NaCl = Na_2Z + 2NaCl + CaCl_2$ and $MgZ + 4NaCl = Na_2Z + 2NaCl + MgCl_2$. Stated differently, the exhausted calcium zeolite (CaZ) and magnesium zeolite (MgZ) plus sodium chloride (4NaCl) (common salt) equals sodium zeolite (Na_2Z) (regenerated) plus the sodium chloride (2NaCl) and calcium chloride ($CaCl_2$) and magnesium chloride ($MgCl_2$) (which is wasted).

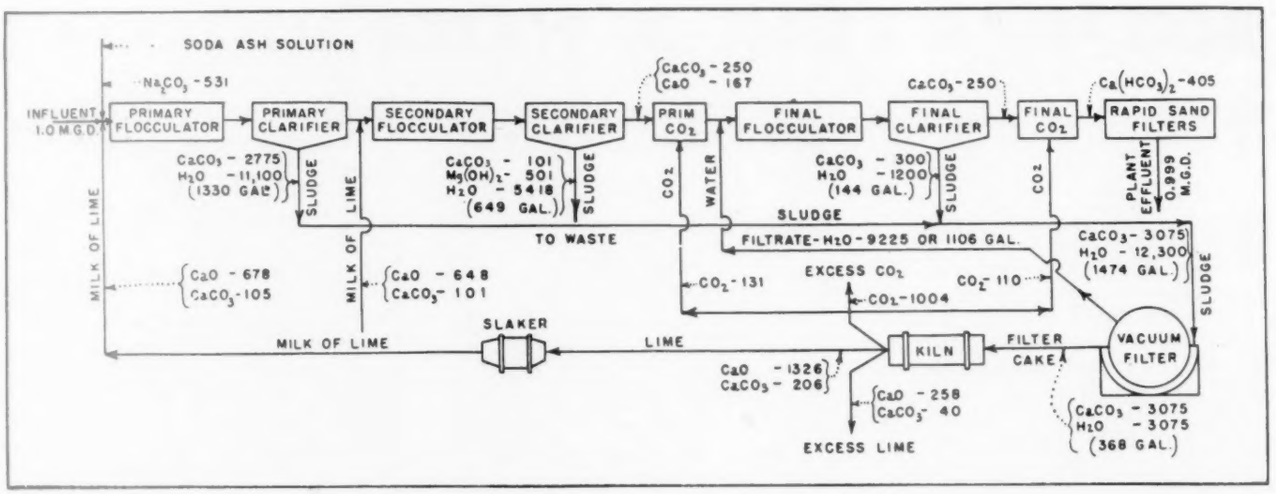
All the Colorado River aqueduct water entering the softening and filtration plant is lime-softened to fewer than 200 parts per million. About one-half of the lime-softened water is zeolite—softened to zero hardness. The combination of the zeolite-softened water with the lime-softened water, on leaving the treatment plant, gives a final hardness of about 85 parts per million.

The chemicals used in the softening and filtration plant include sodium chloride, chlorine, phosphates, ammonium sulphate, coagulant, lime, activated carbon, and carbon dioxide. At present the lime is obtained at a specially low contract price from a near cement plant; but later, when the treatment volume of the water plant has increased to more than 50 million gallons per day, a lime-reclamation plant is to be operated at the treatment works which will make use in the softening process of the $CaCO_3$ now wasted to the Pacific ocean.

The lime obtained from the cement plant is dumped in a bin and passed by a feeder to a lime slaker from which it flows as milk of lime into the water to be lime-softened. As the lime is hot when it is received from the cement plant, it is cooled before reaching the 35-ton capacity bin. The lime-plant equipment includes a 10-ton per hour rotary cooler 5 feet 4 inches by 26 feet in size, a 5-horsepower cooler drive motor, a 12-inch screw-conveyor, a 7-inch Stephens-Adamson Redler conveyor, a 6-foot Nichols-Herreshoff lime calciner, a 30- by 12-inch Oliver filter, oil-burning and gas-burning equipment, two 23-inch by 48-inch filtrate pumps and receivers, vacuum regulators, a 15- by 36-inch moisture trap, a dust-collector fan, and a sump pump.

In precipitating the calcium bicarbonate by adding the free CaO little or no flocculent magnesium hydroxide is present, so that a crystalline and heavy practically pure calcium carbonate or limestone precipitate is obtained. Recovery of the calcium carbonate from the sludge would aid the waste disposal problem and also allow utilization of this good material for producing lime. Space for a future lime-reclamation plant has been reserved adjacent to the lime receiver and cooler building.

Softening and filtration plant of the Metropolitan Water District of Southern California.



Flow-sheet of lime reclamation in water softening.

In the proposed reclamation plant the $CaCO_3$ sludge obtained from the clarifiers will be partially dewatered by a rotary vacuum filter, or a continuous centrifuge or some other machine. The cake obtained in this process will then be passed to the calcining furnace which may be of the multiple-hearth, rotary or other type. After the cake has been burned in the furnace it will be classified if necessary to eliminate undesirable grits, and then it will be slaked. The slaked lime will then be delivered to the lime-feeding equipment above the mixing channel of the water plant. Carbon dioxide will be obtained as a by-product and it can be used for re-carbonation of the water.

The simple procedure outlined above could be adopted at the water plant if there were no, or almost no, magnesium in the aqueduct water. But since this water contains 25 parts per million of magnesium as Mg, the repeated reclamation of the calcium carbonate by the above-described procedure would increase the percentage of magnesium eventually to such an extent, that the lime would become unsuitable for softening. The magnesium oxide in this lime would merely be an inert material to be handled repeatedly and in increasing volume. In the procedure actually to be followed the building up of magnesia in the lime obtained from the calcium carbonate must be eliminated or kept within a quantity range assuring desirable operation (see the flow-sheet).

Considering that Colorado River water has a total hardness of 305 parts per million, a carbonate hardness of 145 parts per million, and that the treated water will have a total hardness of 125 parts per million, a one-day flow of 100 million gallons of the water through the plant results in a theoretical excess production of about 25,800 pounds of CaO; this lime being essentially free of magnesia. This quantity can be obtained by using the Hoover process of lime reclamation as applied to the softening of water. Its developer is Charles P. Hoover, who, in company with another consulting engineer, J. M. Montgomery, designed the water-treatment works for the Metropolitan Water District of Southern California. It is anticipated that lime produced in excess of that needed in the treatment plant can be marketed as agricultural lime in contiguous territory, or that it can be sold to other municipalities for use in sewage and industrial waste treatment.

The accompanying flow-sheet of the Hoover Process of lime reclamation in water softening as designed for the water-treatment works has been worked out on the basis of handling one million gallons per day of the Colorado River aqueduct water. It has been assumed that the lime has a solubility of 1.31 grams of CaO per liter. Note in the flow-sheet how the elimination of the magnesium build-up is effected. Just sufficient lime is added in the first stage of treatment to precipitate all the calcium present in the bicarbonate form; and the additional lime necessary to precipitate the magnesium is added in the second stage. Then in the third stage essentially pure calcium carbonate is precipitated in the final clarifier by adding carbon dioxide to the caustic effluent from the secondary stage in which the magnesium was eliminated. The sludge obtained from the primary and final clarifiers or stages is used in reburning, but the sludge obtained from the secondary stage or clarifiers is wasted as it contains the magnesium.

In this flow-sheet all quantities are in pounds, figured on the basis of an average analysis of Colorado River water of 300 parts per million total hardness and 145 parts per million carbonate hardness, softened to a total hardness of 125 parts per million. The flow rate through the treatment works, as used in this flow-sheet, is one million gallons per day. The effluent from the rapid sand filters is divided, part flowing through the zeolite softeners and the remainder flowing direct to the plant outfall to join the zeolite-softened water.

Car Shortage Seen in September-October

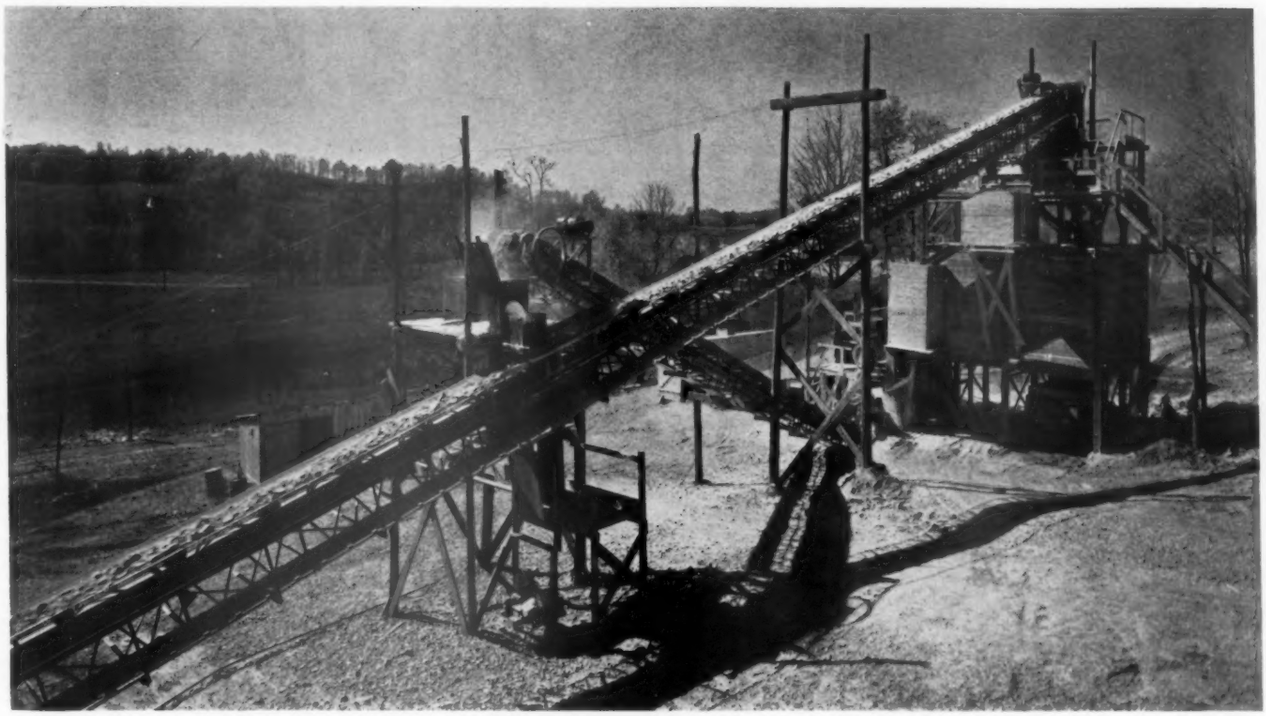
Shippers are urged by the Department of Commerce to exert every effort to relieve a tight freight-car situation during the coming peak shipping season in September and October.

These two months are the seasonal high point of the shipping year. Besides, the rapidly expanding defense program is placing increasingly heavy demands on railroads, for the movement of both raw materials and products of new manufacturing plants. Recent carloadings exceed 850,000 per week.

Owing to the low level of surplus freight cars, unusual precautions this year are being taken to avoid the use of cars for temporary storage.

Suggestions offered shippers by the Department of Commerce for relieving materially the anticipated difficulty include: see that cars are loaded to capacity; have cars loaded and unloaded promptly; ship commodities wherever possible either before the middle of September or after the end of October; extend the loading and unloading days in those industries operating on a 5-day basis to 6 or 7 days if this will shorten the standing time of cars; do not order cars until commodities are ready to load; keep cars moving; avoid inflation in car orders by not ordering more than actually needed.

New Plant Supplies Crushed Stone to Burns City Ammunition-Storage Depot



Main belt-conveyor to the screening plant and return conveyor from the two secondary crushers.

By HARRY F. UTLEY

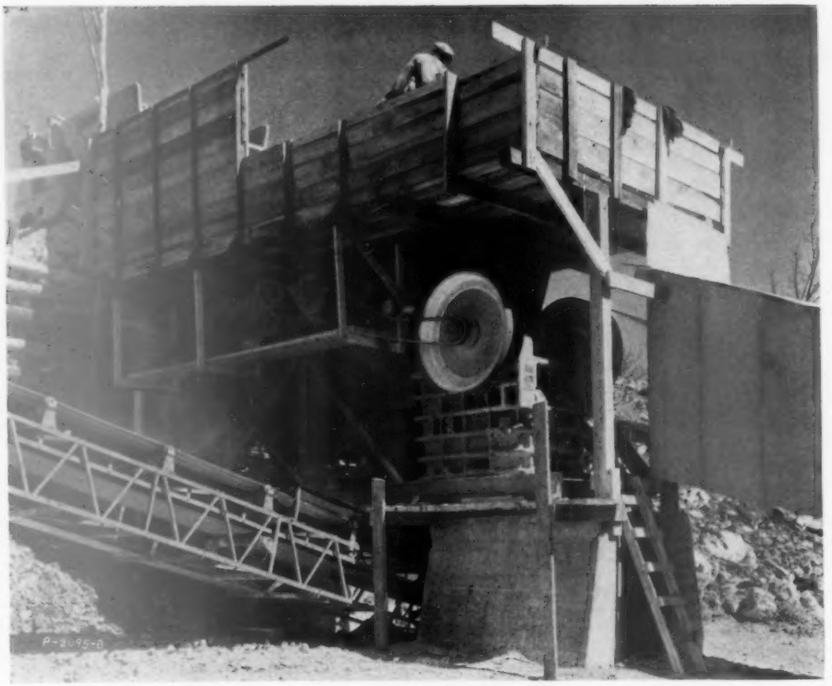
THE peaceful hills of Southern Indiana west of the dimension-stone district of Bedford are feeling the impact of the defense program. Thousands of acres of sub-marginal land near the town of Burns City is being leveled and excavated to become the site for an immense $15,000,000 ammunition storehouse for the United States Navy. It is officially known as the Burns City Naval Storage Depot. A network of roads and rails is being laid to serve the reinforced-concrete igloos which will store some of the huge quantities of powder and high explosives soon to be produced in our "arsenal of democracy". The Maxon Construction Company of Dayton, Ohio has the general contract.

Crushed stone for the roads and ballast for the rails were among the first needs. They are being supplied by a new plant which was especially erected to serve this project and is located about 10 miles from the depot. It is owned and operated by Ralph Rogers & Company of Bloomington, Indiana and is the second such plant set up by the Rogers organization, the first having served Camp Forrest at Tullahoma, Tennessee (*P & Q*, June, 1941, page 39). The initial contract at Burns City is for 60,000 tons of material, but considerably more stone will be needed later on when construction gets well under way. Ultimately it is expected that 300,000 tons will be supplied.

The quarry is being worked on three levels, drilling being done with Ingersoll-Rand wagon-drills. A Koehring 1¼-cubic yard Caterpillar Diesel-powered shovel loads the stone into two Koehring Dumptors, also powered by Caterpillar Diesels, each having a capacity of 5 cubic yards. An earth-and-rock fill allows the Dumptors to discharge their loads into an elevated receiving bin which supplies the process-

Shovel loading one of the 5-cubic yard hauling units.

Dumping a 5-cubic yard load into the plant hopper.

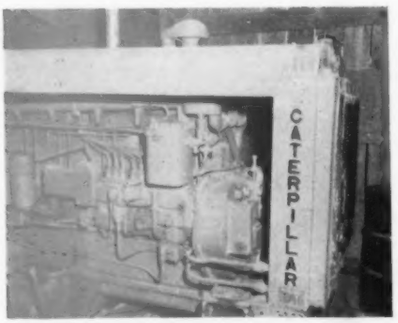


View of the traveling-grizzly feeder, primary crusher, and belt-conveyor to screening plant.

ing plant. The plant was designed and built by the Pioneer Engineering Works.

The shovel-size stone first goes to a Pioneer 24- by 36-inch primary jaw-crusher *via* a Pioneer traveling-grizzly feeder. The crusher product, along with the by-passed feeder throughs, is carried on a 30-inch by 150-foot belt-conveyor to the top of the screening plant.

Two Pioneer double-deck screens set in tandem on a single frame separate the stone. Both are 4 feet wide, the first being 10 feet long and the second 8. Material over 4 inches in size passes the top decks of both screens and goes to a Pioneer 10- by 20-inch reduction



This Diesel engine, one of seven used at the plant, drives the two secondary crushers.

jaw-crusher. Bottom-deck rejects on the second screen are also re-crushed, this time in a 3-foot Symons cone crusher, the crushed material from both secondaries being carried back to the main 150-foot conveyor by a 24-inch by 80-foot return belt-conveyor. The throughs from the bottom decks of both screens and the oversize from the bottom deck of the first screen are chuted to truck-loading bins which have a combined capacity of 400 tons. Sizes from 2 inches down are produced. Dump trucks—as many as 30 being in service some days—carry the stone to the Burns City project. The trucking is being done under separate contract.

The material produced during the first 60 days after the plant was opened on April 15 was processed in the manner described and was used only for stone roads and ballast purposes. With the expectation that concrete aggregates will form much of the later output, some changes will be necessary. Already a separate washing plant is being erected, the equipment including a Barber-Greene belt-conveyor, Blaw-Knox bins, a Link-Belt elevator, and a Symons screen. Water will be pumped from a convenient creek.

Mention has already been made that the prime movers on the shovel and Dumptors are Diesel engines. The entire operation is, in fact, powered by Diesels. One Caterpillar D13,000 drives the primary crusher and feeder; another powers the jaw- and cone-crushers. A Caterpillar Diesel-generator set supplies power for the individual motors which drive the conveyors and screens. Still another Diesel runs the Sullivan air-compressor.

The plant usually operates 8 hours daily, but runs of 12 and 14 hours have been made. The hourly capacity is 150 tons.

E. H. Kerr is the superintendent, having been associated with Mr. Rogers since 1912. He was in charge of the erection of this plant and also set up the Tennessee plant mentioned previously.

The main plant of the company is located at Bloomington, Indiana. The company is also in the ready-mixed-concrete business, operating the Bloomington Ready Mixed Concrete Company.

Admixtures *(from page 50)*

The slabs of standards cement and inferior sand were 80 to 98 per cent. scaled after 10 to 15 thawing cycles, while the standard cement-good sand slabs were 34 to 75 per cent. scaled. The Portland-natural blend gave a better performance during the first winter, but scaling proceeded rapidly during the second winter.

The Portland-fish oil stearate and Portland-Vinsol resin blends developed no scaling during the first winter with either the inferior or the good sand, while scaling at the end of the second winter after 61 cycles of thawing ranged between 0 and 8 per cent. The resin proved to be the most economical of the materials tested.

Since no serious strength loss is developed by the addition of 0.03 to 0.05 per cent. resin, the point at which maximum scale resistance is produced, there is no appreciable weakening of the concrete. Furthermore, the improvement in workability permits a reduction in the water-cement ratio, offsetting the small strength loss.

Because the resin-treated cement reduced the segregation of water, mortar and aggregate with both good and inferior sand, there is reason to believe the resin will reduce scaling due to overworking, as well as that due to the use of ice removal agents or that caused by the use of inferior sand.

The resin-treated cement is "fatter" and more workable. Since the Vinsol is added at the cement mill, no change in equipment is required of the contractor. Contractors who have used the new cement report a noticeable reduction in segregation of aggregate, "bleeding" and formation of pockets, reducing the time between placing and finishing to such an extent that the finishing crew can work immediately behind the mixing and placing operations.

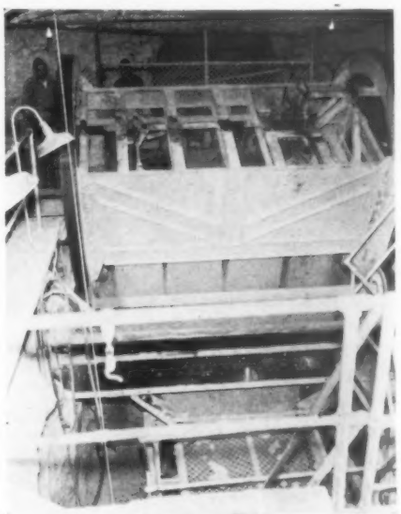
Cost of the Vinsol ingredient amounts to only a fraction of a cent per barrel of cement. The contractor's cost of concrete, however, should be lowered by easier placing and finishing, according to Hercules engineers.

Potash *(from page 39)*

crushers with smooth rolls. The material through each roll crusher goes back on its screen. Some of the minus 10-mesh material is carried on belt conveyors to a bin for loading into railroad cars as a 25- to 30-per cent. K_2O manure salt.

The belt-conveyors in this plant use belting made by the New York Belting & Packing Company, the B. F. Goodrich Company and the Republic Rubber Company.

Another system of conveyors carries some of this minus-10-mesh material into the refinery to be used in making



Carload of potash being discharged by rotary car dumper to primary crusher.

a higher-grade product. This material is discharged from the conveyors into the feed bins of pebble ball mills. In the mills brine saturated with sylvite and halite is added at room temperature in order to preclude the solution of sylvite during grinding. The finely-ground product of these mills goes into Akins screw classifiers in closed circuit with the mills. The fines from the classifiers go into a Dorr thickener. The pulp from the thickener goes to a Minerals Separation Company rougher flotation machine where reagents are added to float the (halite) salt. This is followed by cleaner cells. The middlings are re-treated.

The tailings from these cells go to thickeners and then to Moore and Oliver filters which recover the brine and waste the salt. The brine, which is saturated with potash, goes back into the circuit at the grinding mills. All of the liquid handling is done with Wilfley pumps.

The concentrated sylvite from both flotation machines goes to Baker-Perkins continuous centrifuges from which the pulp goes to two Hardinge Ruggles-Cole rotary driers. The dried sylvite is stored in warehouses as muriate of potash containing 61½ per cent. of K_2O. It is recovered from storage by scrapers and belt conveyors feeding to Manierre box-car loaders. A Western Precipitation Corporation Multiclone keeps loading operations dustless.

A granular product is also made for direct application as a top dressing and in fertilizer mixing. The fine high-grade muriate is pressed into briquettes which are then crushed and screened with the fines going back into the briquette press.

All of the power for the plant and mine is generated by six Diesel engines with a total of 5,500 horsepower. A Worthington engine and two De La Vergne engines operate on fuel oil. Three Nordberg engines operate on a Diesel cycle with natural gas as fuel. These engines can be re-converted to use fuel oil in a few hours' time. Another 2500-horsepower Nordberg engine has been ordered. All are direct connected to 2300-volt alternators and this voltage is used on all large above-ground motors. All underground motors are 220 volts and all of the small above-ground motors use 440-volt current.

All of the water used for cooling the engines and compressors and for human consumption is shipped from Carlsbad in tank cars. What little water is consumed in process is pumped from the mine shafts.

The company provides houses for married employees and bunkhouses for unmarried men. There is also a dining room, swimming pool, tennis courts, etc. There are also surface machine and electric shops supplemented by underground shops in which minor repairs are made.

INCORPORATIONS

CATAWBA LIMESTONE CORPORATION, Newton, North Carolina. $50,000. D. N. Jones, S. P. Marsh, Mrs. D. N. Jones, Mrs. S. P. Marsh.

RYAN BLOCK COMPANY, Utica, Michigan. $10,000. Ralph B. Gorelick, 3308 Webb Street, Detroit.

CONCRETE DELIVERY CORPORATION, Indianapolis. 1,500 shares n.p.v. William F. Nixon, L. W. Eaversson, Fred Hauk.

WILBERT VAULT WORKS, Owensville, Indiana. 100 shares n.p.v. B. B. Bickes, A. D. Kahn, Irma Bickes.

CRAMER CONCRETE CORPORATION, Dallas. $3,000. Ray Cramer, B. J. Cramer, J. W. Crowley.

CINDER CONCRETE BLOCK, INC., Newark, New Jersey. 2,500 shares. Harry Phillipson, agent.

BURROUGHS TRANSIT-MIX COMPANY, Grand Rapids, Michigan. $50,000. James R. Burroughs, Max Springer, Walter P. Love.

GULF SAND COMPANY, Beaumont, Texas. $50,000. C. W. Lane, J. W. Bourbon, Edward F. Lotz.

PERSONAL MENTION

J. C. BEST, vice-president of the National Gypsum Company, has been appointed to the foreign trade committee of the Buffalo Chamber of Commerce.

CHARLES T. RABER has been appointed superintendent of the Glens Falls Portland Cement Company and DONALD A. ENNIS has been made assistant superintendent. Since 1937, when he joined the company, Mr. Raber had been chief chemist.

E. J. AUSTIN, of Owatonna, Minnesota has sold his gravel pit to G. C. Kohlmier.

SEXTON MANTZ has been promoted to manager of the Pittsburgh plant of the United States Gypsum Company.

J. D. and F. W. MORSE have opened a sand-and-gravel plant at Harrisburg, Oregon.

Chas. M. Doolittle.

CHARLES M. DOOLITTLE, 65, president and general manager of the Canada Crushed Stone Corporation, died suddenly on July 5 at his home in Hamilton, Ontario. He was a native of Painesville, Ohio. After engaging in mining activities in northern Ontario, he entered the quarrying business at Rymal, Ontario, in 1904 and acquired other quarries and stone plants in the province in later years. A regional vice-president of the National Crushed Stone Association, he had long been active in association affairs. Funeral services were held July 8 with burial at Hamilton.

E. A. Hermann.

EDWARD A. HERMANN, 84, president and founder of the Reliance Whiting Company of Alton, Illinois passed away June 12. He formed the company in the early years of this century and was a frequent contributor to the technical press. His best known work is a book on *Steam Shovels and Steam Shovel Work*. He is survived by the widow and one son, Charles.

FOREIGN PRACTICE

New Binding Agent from Hydraulic Gypsum

Raw gypsum is ground sufficiently fine to pass a 1,225-sq. cm. screen. Then 2 per cent. phosphorus acid or sodium phosphate is added and, if necessary, also substances containing silicic acid. Burning is done in a tunnel kiln between 980 and 1,260 degrees C. A clinker is obtained which is ground like cement clinker. The product is claimed to show a tensile strength of 42 to 84 kg. per sq. cm., to shrink less than cement, and to be more resistive against certain acids.—*Revue des Materiaux de Construction et de Travaux Publics,* no. 362, pp. 193-194 (November, 1939).

Method for Making Sawdust Concrete

German Patent Kl. 80b, Gr. 21/04, No. 666785, issued 29.9.38. I. G. Farbenindustrie A. G.

150 parts of sawdust by volume are mixed with a solution of 40 parts of 5 per cent. waterglass. To this damp, but not dripping, mixture are added 50 volume parts of cement, well mixed, and then 15 volume parts of water. This mixture is then tamped in desirable forms, from which it can be removed soon. The wood-concrete material has a volume-weight of 1.08, and after 28 days' storage reaches a compressive strength of about 66 kg. per sq. cm.—*Zement,* vol. 29, no. 22 (May 30, 1940), p. 275.

Limestone as Admixture in Mortar and Concrete

A. Steopoe concludes in a report on limestone-dust admixture for mortar and concrete, based on his chemical test results, that in the presence of limestone dust in a hardened Portland-cement paste the "blowing" action of the gypsum is favored very strongly, so that this dust can not be recommended as an admixture for concrete for marine construction. The observation that, in the absence of hydraulic admixtures and in the presence of limestone dust, the "blowing" action of gypsum is very strongly favored is in harmony with the observation made by Feret, and shows that the contentions of Jung and others have no general validity.—*Zement,* vol. 29, no. 42 (October 17, 1940), pp. 533-535.

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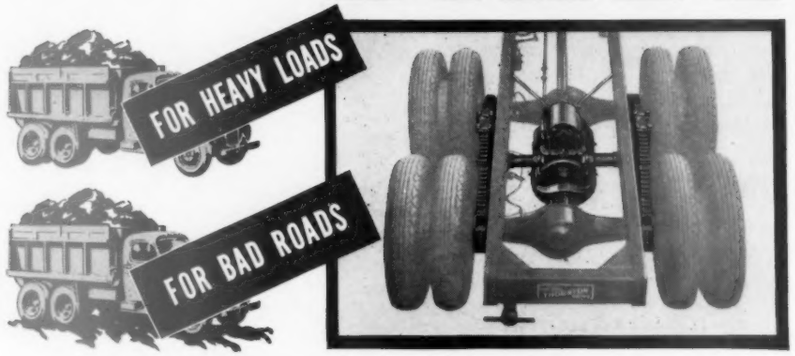

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OCCUPATIONAL DISEASES and the LAW

Evidence

Hansell-Elcock Company et al. v. Industrial Commission et al., decided by the Supreme Court of Illinois, February 14, 1941, rehearing denied April 8, 1941; reported at 33 N.E. (2d) 194.

An award by the Illinois Industrial Commission under the Workmen's Occupational Diseases Act was contested, largely on the ground that the award was contrary to the evidence. The court holds that in view of the worker's prolonged exposure (as an iron molder) to the hazard of silicosis, the filing in his behalf of a petition for partial waiver of compensation (under the terms of the act) for disability therefrom, his discharge as a poor occupational-diseases insurance risk, his evident disablement, and the sharply conflicting testimony of medical witnesses, the court is "unable to say that the decision of the Industrial Commission was palpably against the weight of the evidence." The award is confirmed.

Tuberculosis

Stewart Warner Corporation v. Industrial Commission et al., decided by the Supreme Court of Illinois, February 14, 1941, rehearing denied April 8, 1941; reported at 33 N.E. (2d) 196.

An award under the Illinois Workman's Occupational Diseases Act is set aside in this decision on the ground that the evidence does not show that the tuberculosis of which the workman died was an "occupational disease." The worker was engaged in testing refrigerators, and the evidence "merely shows conditions which will activate tubercle bacilli and cause tuberculosis. It does not show that he was poisoned or that he had an occupational disease."

Pneumoconiosis

Sutter v. Kalamazoo Stove & Furnace Company, decided by the Supreme Court of Michigan, April 8, 1941; reported at 297 N.W. 475.

In this case a widow sought compensation under the occupational-disease amendment to the Michigan Workmen's Compensation Law (Act No. 61, Public Acts of 1937; Statutes Annotated, Sections 17.220 *et seq.*) for the death of a molder who died of pneumoconiosis, silicosis and tuberculosis. The evidence showed that dust from a sand-blasting operation in an adjoining room entered the foundry. The Department of Labor and Industry denied compensation, and that denial is upheld in this appeal, on the grounds that: (1) tuberculosis is not compensable under the act; (2) silicosis is only compensable under Section 2, when it is caused by mining; and (3) pneumoconiosis is compensable if "caused by" quarrying, cutting, grinding or polishing of metal, which is construed to mean that the person on whose account the claim is made must have been engaged in one of those occupations. The court holds that the act must be strictly construed, and that statutory liability under the occupational-disease amendment is not predicated upon the maintenance of sanitary conditions, but upon the schedules specifically set forth in the act.

LABOR DECISIONS

Effect on Commerce

Florida Fruit & Produce Company, Inc. et al v. United States, decided by the U. S. Circuit Court of Appeals, Fifth Circuit, February 13, 1941; reported at 117 Fed. (2d) 506.

The employer here, appealing from a convinction of violating the Fair Labor Standards Act of 1938, claimed that the act is unconstitutional because an accused person is not given opportunity "to be heard on the question of the effect upon interestate or foreign commerce of alleged conditions in his place of business." The court rules, however, that whether or not low wages and long hours injuriously affect interstate commerce and therefore should be prohibited is for Congress, and not for a jury, to decide. Certain claims of discrimination because of exemptions afforded in the act are also held not to affect the constitutionality of the act.

Contract

Triboro Coach Corporation et al. v. New York State Labor Relations Board et al., decided by the New York Supreme Court, Appellate Division, Second Department, April 28, 1941; reported at 261 App. Div. 636.

A contract between the employer and a union provided that it would be effective until October 20, 1936, and thereafter for another term, unless either party gave notice before the end of the current term terminating the contract. Before the date concerned the employer

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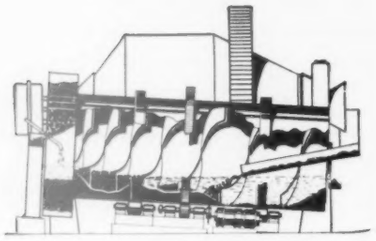

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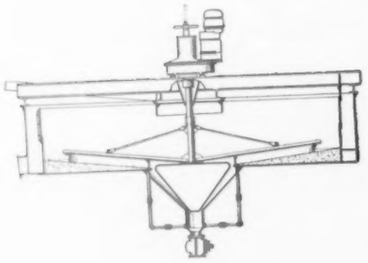

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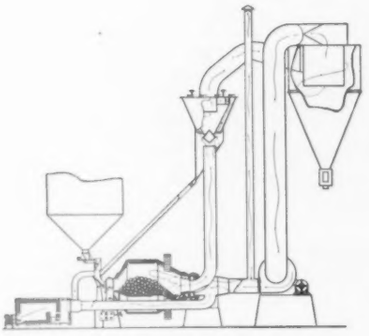

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and union conducted certain negotiations and on November 14, 1939, executed a new contract superseding the old one. Meanwhile, on application of another union, the State Labor Relations Board directed an election to determine by what union the employees desired to be represented. The board held, and contended in this appeal, that the signing of the new contract after such direction of an election constituted an "unfair labor practice" in violation of the New York State Labor Relations Act (Labor Law, Article 20). The court rules, however, that the negotiations which led to the signing of the new contract did not have the effect of terminating the old contract on October 20, 1939; that the old contract thereafter remained in effect until the signing of the superseding contract on November 14, 1939; and that, consequently, the finding of the board that the signing of the new contract was an "unfair labor practice" was erroneous.

Wage Order

People v. Johnson, decided by the Appellate Department, Superior Court, Los Angeles County, California, January 30, 1941; reported at 109 Pac. (2d) 770.

The defendant was charged with paying to women employees a wage less than the minimum wage fixed by an order of the Industrial Welfare Commission; the complaint alleged that he was "an employer of women in an unclassified occupation in the food-packing industry". In support of the charges the state introduced in evidence Order No. 10A made by the Industrial Welfare Commission on June 8, 1923, relating to "unclassified occupations." The court holds this order void because it shows on its face that the commission, in making it, disregarded the directions of the legislature by lumping together for consideration a miscellany

Company Union

National Labor Relations Board v. Dow Chemical Company (Midland Chemical Workers Association, Intervenor), decided by U. S. Circuit Court of Appeals, Sixth Circuit, February 6, 1941; reported at 117 Fed. (2d) 455.

The evidence in this case is held to sustain the conclusion of the National Labor Relations Board that the employer had violated its employees' rights in that an employees' association had been organized, with full approval and assistance of the company, on company time and on company property; that the company had aided the association and thwarted a C.I.O. union by solicitation of membership for the association and by espionage, threats, coercive statements, interference with a meet-

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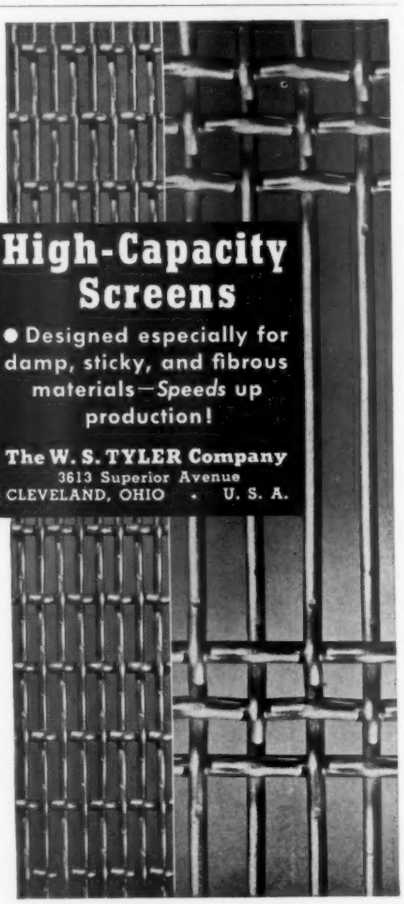
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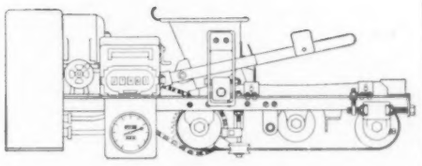

Bulletin 33-C

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ing, and by discriminatory discharge and "strategically timed concessions." An order requiring the company to withdraw recognition from and to disestablish the association will be enforced.

TRAFFIC News Digest

I.C.C. Decisions

Polished Granite.—I. and S. M-1400 on polished granite from Kansas City to Chicago. By division 2. Proposed reduced commodity rate on polished granite in truckloads from Kansas City, Missouri and points grouped therewith to Chicago found not justified. The rate was 30 cents on a minimum of 18,000 pounds, and the present rate is 35 cents on a minimum of 16,000 pounds. The commission said it was not pursuaded that a reduction had been justified or that such a rate, with the increased minimum, would not obtain some traffic for the respondents in view of the admitted advantages of their service to shipper. It was also stated that a rate of 35 cents, minimum 18,000 pounds, for the distance under consideration would yield about 12.4 cents a truck-mile. Cancelation ordered without prejudice to the filing of new schedules in conformity with the views expressed in the report.

Sand.—Fourth-section application No. 18296 on sand, crushed stone, and gravel to Valparaiso, Indiana, embracing fourth-section application No. 18500. By division 2. Authority granted by F. S. O. 14259 to establish and maintain, subject to conditions, rates of not less than 66 cents a net ton on sand and gravel from Joliet and Plainfield, Illinois, and on crushed stone from Bellwood, Joliet, McCook, Lehigh, and Thornton, Illinois, to Valparaiso, Indiana, as to which temporary relief was given by F.S.O. 13784, as supplemented, without observing the long-and-short-haul part of the fourth section.

Stone.—The Southern Motor Carriers' Conference has joined a request filed by E. L. Hart on behalf of various Georgia granite companies asking the commission to vacate its order in MC C-250 on stone from Georgia to New England in trunk-line and central territories, dated February 14. Some time ago the Commission vacated I. and S. M-1474, which covered proposed rates of a similar character.

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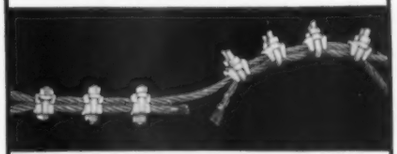

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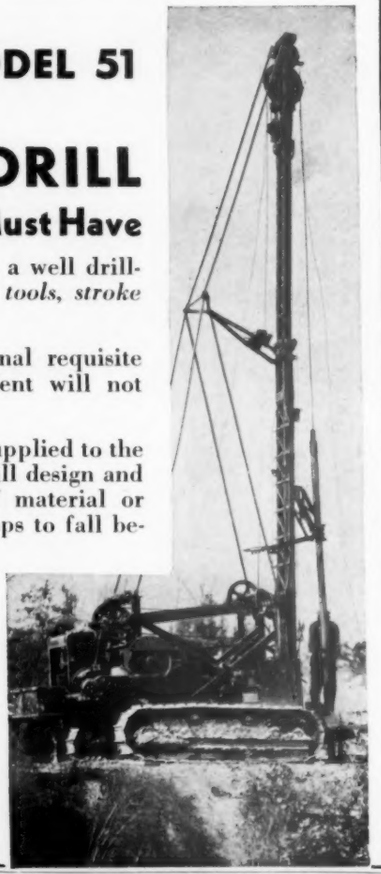

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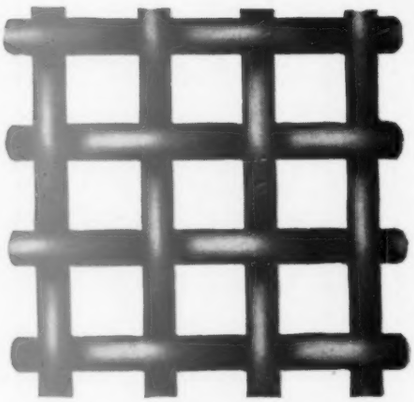

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The petition said the vacation was asked for because the presently effective rates maintained by the petitioning bureau were competitive with existing rates maintained by southern railway carriers. It was said by the bureau that to its knowledge no complaint had been filed by competing transportation agencies against the motor carrier rates, and, therefore no reason existed for the investigation.

Marble.—Docket No. 28573, Hawkins Marble & Tile Company *v.* A. T. & S. F. *et al.,* heard by Examiner Carl A. Schlager. Dismissal proposed. A column 30 rate of 86 cents charged on polished marble from Knoxville, Tennessee to Wichita, Kansas, delivered in 1938 is found applicable. A combination rate of 76 cents was sought.

Sand, Gravel and Crushed Stone.—Fourth-section application No. 18857 on sand, gravel, and crushed stone to Illinois points. Applicants authorized by fourth-section order No. 14240 to establish and maintain until December 31, over their single lines on the above mentioned commodities in carloads, minimum weight 100,000 pounds, rates of 89 cents a net ton from Dickason Pit, Standard Pit and Cayuga, Indiana, and 95 cents from Terre Haute, Indiana, to Brubaker and Salem, Illinois, and 76 cents from Riverton, Indiana to Alma, Tonti, Odin and Centralia, Illinois, without observing the long-and-short-haul part of the fourth section, as to which temporary relief was given in fourth-section order No. 14223.

It was said by the commission that it did not approve any rates that might be filed under this authority, all such rates being subject to complaint, investigation and correction if in conflict with any provision of the interstate commerce act. The relief is in line with that given by the Illinois commission on state traffic, the purpose of which is to enable the carriers and Indiana producers to participate in the construction of roads and buildings brought about by the recent development of oil resources in the district between Salem and Centralia.

Motor Proposed Reports

Trenton, Illinois.—MC 79269, Sub. No. 1, Glenn Dressel and Ed Dressel, extension, bulk commodities. Joint board 135. Certificate proposed. Sand, crushed stone, lime, brick and building blocks between St. Louis, Missouri, on the one hand, and, on the other, points in Lebanon Township of St. Clair County, Illinois, points in Clinton County, Illinois, and Sandoval and Centralia, Illinois, over regular and irregular routes.

Winston-Salem, North Carolina.—MC 102473, Sub. No. 1, Grady B.

Myers, common-carrier application. Joint board 7. Certificate proposed. Ground agricultural limestone, in bulk, from Austinville, Virginia to points in Forsyth County, North Carolina over irregular routes.

Carlsbad, New Mexico.—MC 39089, Sub. No. 1, John W. Womble, extension of operations. Joint board 33. Denial of certificate proposed. Sand and gravel between Four Mill Draw near Orla, Texas, and points in Eddy County, New Mexico, and of general commodities, with exceptions, between Carlsbad and Loving, New Mexico, and points in Eddy County over irregular routes.

Silver Springs, Maryland.—MC 102515, James E. Hood, contract-carrier application. Joint board 120. Permit recommended. Sand and gravel from a pit located one-half mile north of Clinton, Maryland to points in the District of Columbia, with no transportation for compensation on return, over irregular routes.

Lanesville, Indiana.—MC 102278, Lorena T. Messin, contract-carrier application. Joint board 155. Served June 18. Permit proposed. Lime, from Milltown, Indiana to Louisville, Kentucky over a specified route, with no transportation for compensation in the opposite direction. Modified procedure. Hearing on request. Exceptions, if any, must be filed within thirty days from date of service.

Fourth-Section Applications

Docket 19119.—Filed by J. R. Peel requesting fourth-section relief to establish rates on sand and gravel in carloads from Picher, Oklahoma to points in Kansas to meet carrier competition.

Docket 19130.—Filed by B. T. Jones requesting fourth-section relief to establish rates on lime in carloads from Lewisburg, Ohio to points in western trunk-line territory, carrier competition and circuitous routes being the grounds for relief. Schedules filed containing proposed rates B. T. Jones I.C.C. 3317, supplement 14.

Docket 19131.—Filed by L. E. Kipp requesting fourth-section relief to establish rates on hydraulic lime and dry building mortar in carloads from points in Wisconsin and Michigan to points in Illinois, Iowa, Minnesota, and South Dakota, circuitous routes and to apply over short-tariff routes rates constructed on the basis of the short-line distance formula being the grounds for relief.

Docket 19132.—Filed by W. S. Curlett and I. N. Doe requesting fourth-section relief to establish rates on slate, crushed or ground in carloads from points in New York and Vermont, to Muncie and Richmond, Indiana, carrier competition and circuitous routes being the grounds for relief.

Docket 19133.—Filed by the C. and N. W. requesting fourth-section relief to establish rates on sand and gravel in carloads from South Beloit, Illinois, to Camp McCoy, Wisconsin to meet market competition.

Docket 19135.—Filed by J. R. Peel requesting fourth-section relief to establish rates on cement and related articles in carloads from Chanute, Fort Scott, Humboldt and Iola, Kansas, and Dewey, Oklahoma to points in the west, circuitous routes being the grounds for relief. Schedule filed containing proposed rates J. R. Peel I.C.C. 3407, Supplement 4.

Docket 19137.—Filed by J. G. Kerr requesting fourth-section relief to establish rates on cement and related articles in carloads from points in the south on the Mobile & Gulf Railroad, short- or weak-line carrier being the grounds for relief.

Docket 13902 (Second Supplemental).—Gravel from La Grange, Missouri to Illinois destinations. Application 18555. Petition dated June 5, filed by R. A. Sperry. Fourth-section order 13902 entered July 24, 1940 in application No. 18555 as modified and amended by supplemental order dated Nov. 27, 1940 which by its terms expires July 1, 1941. Further modified and amended so as to provide that the relief authorized therein shall continue until December 1, 1941.

Docket 13968 (Second Supplemental).—Sand and gravel from Dubuque, Iowa to Proving Grounds, Illinois. Application 18631. Petition dated May 26 filed by R. A. Sperry. Fourth-section order 13968 entered September 17, 1940 in application 18631 as modified and amended by supplemental order dated December 17, 1940 which by its terms expires June 28, 1941. Further amended and modified so as to provide that the relief authorized therein shall continue until December 28, 1941.

Trade Literature

Bulk-Flo . . . Continuous Flow System for Loose Materials Handling, (Bulletin 1975), 24 pages. Link-Belt Company, Chicago.

Rogers Heavy-Duty Gooseneck Trailers, 28 pages. Rogers Brothers Corporation, Albion, Pennsylvania.

Elevating and Conveying Machinery, (Catalog 200), 124 pages. Gifford-Wood Company, Hudson, New York.

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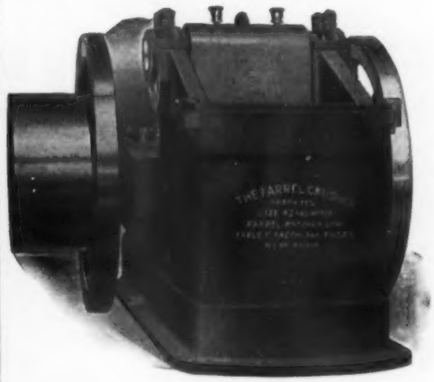

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17 John St. New York, N. Y.

Amsco Power Shovel and Dragline Parts, (Bulletin 641-S), 8 pages. American Manganese Steel Company, Chicago Heights, Illinois.

Winslow Motor Truck Scales, 4 pages. Winslow Government Standard Scale Works, Terre Haute, Indiana.

Safety Equipment for Pits and Quarries, 8 pages. Mine Safety Appliances Company, Pittsburgh.

Efficient Blasting with Safety Fuse, 24 pages. Ensign-Bickford Company, Simsbury, Connecticut.

More Profit with a Denver Unit Flotation Cell, 8 pages. Denver Equipment Company, Denver, Colorado.

Are You Mixing Too Many Dollars in Your Concrete? 8 pages. Scientific Concrete Service Corporation, Washington, D. C.

Industrial Division Catalog 40. Continental Gin Company, Birmingham.

Brooks Load Lugger Puts Hand Loading on a Machine Cost Basis, 4 pages. Brooks Equipment & Manufacturing Company, Knoxville, Tennessee.

Type TY Reduction Crusher, (Bulletin 3112), 24 pages. Traylor Engineering & Manufacturing Company, Allentown, Pennsylvania.

Blaw-Knox Concrete Buckets, (Catalog 1816), 20 pages. Blaw-Knox Company, Pittsburgh.

Johns-Manville Packings, 44 pages. Johns-Manville Corporation, New York.

Raymond Flash Drying System, (Bulletin 50), 4 pages. Raymond Pulverizer Division, Combustion Engineering Company, Chicago.

Miles Concrete-Products Plant Equipment, 4 pages. Miles Manufacturing Company, Jackson, Michigan.

NEW MACHINERY and SUPPLIES

• Scraper-Loader

Sauerman Brothers, Inc., Chicago, has produced a crawler-mounted scraper-loader of new and interesting design, a unique feature being a hydraulically controlled "teetering" ramp. The machine is equipped with a 1-cubic yard Crescent scraper bucket. The scraper drag-cables are 400 feet long. The power unit which operates the scraper bucket is a double-drum hoist driven by either a 60-horsepower gasoline or Diesel engine or by a 40-horsepower electric motor. Power is furnished to the crawlers from a take-off on the hoist.

In handling loose material from a pit, bank or stockpile 400 feet wide, this machine will load an average of eight 5-ton trucks per hour, assuming that the bucket is so operated as to maintain an average length of haul of about 200 feet. Any reduction in haul brings a proportionate increase in hourly capacity.

Two views of the Diesel-powered scraper-loader.

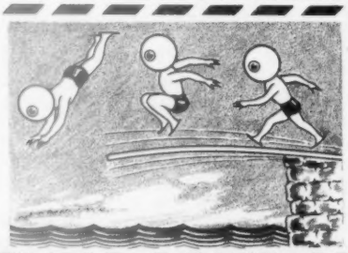
When moving around a job or to a new location, the front of the "teetering" ramp is raised from the ground and held in place by hydraulic rams. Travel speed, throttle-controlled, is 88 feet per minute.

• Conveyor

The Link-Belt Company announces the Bulk-Flo power-operated conveyor system. It can be used for the positive and continuous conveying of flowable granular, crushed, ground or pulverized materials of a non-corrosive, non-abrasive nature, in capacities of one to 140 tons per hours.

The conveying medium employs a specially designed chain, usually made of malleable iron, to which solid peak-top flights are rigidly attached at every pitch. These divide the material in the conveyor duct into a continuous series of batches, which are moved positively

Bulk-material conveyor.



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You get the greatest output when every square inch of screen is vibrating with its maximum dynamic energy. That is the purpose of TRI-VIBE in the LEAHY Type C No-Blind Vibrating Screen. It triple-powers the free-swinging screen jacket and insures faster screening by keeping the meshes clear. It is today's answer to *fine mesh* screening of wet or dry materials.

Ask for Bulletin 14-H

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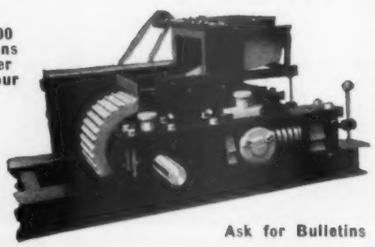
The Original Deister Co.
Est. 1906
911 Glasgow Ave., Fort Wayne, Ind.

"CRACK DOWN" on Hard Rock
with NEW HOLLAND
Super Roll Crusher

100 Tons per Hour



Ask for Bulletins

This "big bruiser" will step up your production and cut down your crushing costs. Patented pulsating feeder doubles the output. Rib shell construction keeps dust at minimum.

Full line of Crushers, Pulverizers, Elevators, Conveyors, Screens, Concrete Mixers, V-Belt Drives, Belting, Motors, Engines, Castings, Power Lawn Mowers and Pick-up Baling Presses.

NEW HOLLAND MACHINE CO., NEW HOLLAND, Lancaster County PENNSYLVANIA

by the peak-top flights, whether there be full load or only a partial load.

Bulk-Flo elevating-conveying units may follow almost any desired path—horizontal, inclined, vertical or curvilinear, and a single self-contained unit may carry in all these directions in the same vertical plane.

They may be fed or loaded at various points to suit conditions. Feed and discharge openings, also openings for inspection and access, are readily provided in the conveyor casing according to the dictates of the individual installation. It loads itself uniformly and gently from hoppers, bins or chutes, without flooding or over-loading. This ability to load itself obviates the need of a separate feeder, thus saving not only the cost of such a feeder but also the added expense of extra supports and additional foundation work.

• V-Belt

A new type of V-belt, with a unique driving surface for either flat pulleys or V-grooved pulleys, is being introduced by The Dayton Rubber Manufacturing Company, Dayton, Ohio.

Marketed under the name of "Dayton Cog-Belt," is designed around a new type of cog construction principle on the inner surface of the belt. It is being manufactured in all standard lengths in A, B, C, D, and E cross-sections, and in perfectly matched sets for multiple drive service.

• Sand Classifier

The Wemco screw-type sand classifier, produced by the Western Machinery Company of San Francisco, is finding favor with aggregates producers. One of the most recent installations was in the plant of the California Rock & Gravel Company near Pleasanton, California, where two units were installed.

The classifiers are of the conventional screw type in appearance but possess numerous important advantages, the manufacturer claims. Occasionally the necessity arises to lift the flights in a Wemco classifier in order to accelerate the removal of sands which may have settled during a shutdown. By using this flight lifting procedure, the screws can be made to "dig themselves out" regardless of the sand overload. The flights are raised or lowered by means of either a motor driven or hand operated mechanism.

Wemco screw-classifier flights are equipped with wear-resistant shoes that are easily removable. The shoes, however, are designed and constructed to give maximum wear and to keep the flights in the most efficient operating condition regardless of the service demands.

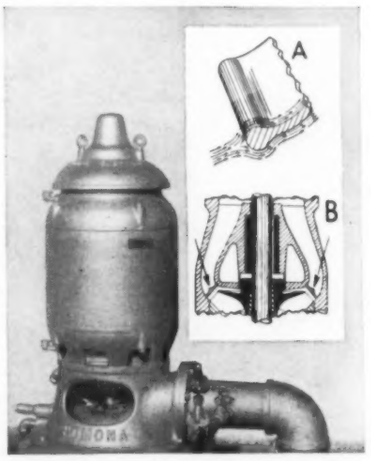
The units can be supplied in screw diameters from 12 to 96 inches.

• Vertical Pump

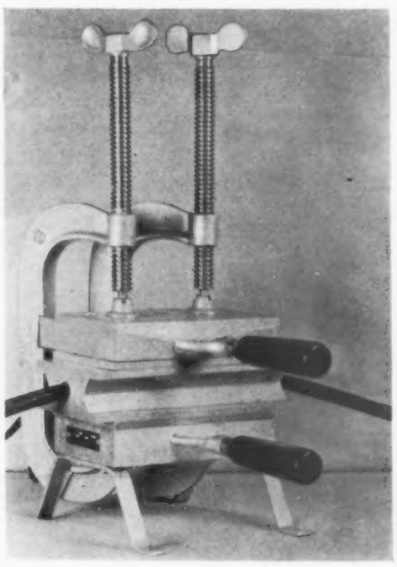
The Pomona Pump Company, of St. Louis, and Pomona, California, has recently been granted patents covering design improvements which eliminate hydraulic losses in pumps, thereby increasing efficiency as much as ten per cent. These improvements, now included in all sizes of Pomona vertical turbine pumps, involve fundamental design changes in the guide vanes, the function of which is to alter, from horizontal to vertical, the flow direction of fluids being pumped.

Previous practice in pump manufacture dictated that these guide vanes can be constructed as thin as possible on the advance edge, on the theory that the less metal the fluid would strike, the less would be the resistance encountered. However, it was discovered by Pomona engineers that, because fluid being discharged by the impeller element flows across the guide vanes at various angles (instead of always directly across the advance edge), eddy-friction loses are encountered, reducing the efficiency of the pump.

By forming these advanced vane ends of a bulbous shape, it was discovered that regardless of the flow direction of the fluid, its direction would always be substantially tangential to the vane surface. Thus, greater uniformity of flow pattern is secured, friction is reduced and efficiency of fluid lift is increased. Furthermore, because of the recessive curve at the rear of the bulb-shaped vane, eddy currents are not developed as under former circumstances.



Typical vertical pump equipped with new type guide vanes. (A) Bulbous shaped end of guide vane. (B) Cross-section of bowl assembly.



The Shaler Company, Waupun, Wisconsin, has improved its industrial vulcanizers for use in replacing rubber insulation covering where cables are spliced or where insulation has become damaged. Interchangeable mold blocks to accommodate various size cables are provided. Other models are made for splicing round or flat rubber belts—all being electrically heated and furnished with cord and plug.

TAYLOR SPIRAL PIPE IS *Sensible* PIPE

IT'S a trim, modern pipe. It has all the load-carrying ability of pipe many times its weight, but without being handicapped by excess bulk. It can be handled more easily, transported less expensively—installed at a cost approximately half that of most pipe of equal rating.

The secret of spiral pipe lies in the spiral reinforcing seam which stiffens and strengthens it from end to end. In Taylor Spiral Pipe this seam has been strengthened and perfected, through 30 years of development, to provide maximum resistance to bursting, collapsing and other stresses.

There is a size and gauge of Taylor Spiral Pipe, with any type of end joint or protective covering, to meet every need. Write for Catalog 404.

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TAYLOR *Spiral* PIPE

Portable Compressor

The Ingersoll-Rand Company has just announced a new line of portable air compressors which, in addition to providing features never available before in a portable, are claimed to reduce average fuel costs up to 40 per cent. compared to previous I-R models. These new machines carry a new trade-name "Mobil-Air."

For many years the Ingersoll-Rand Portable has been available with either a Waukesha gasoline engine or with the well-known Hesselman-type low-compression oil engine. Oil-engine units were of approximately the same size and weight as gasoline-engine-driven units.

In the K-series Mobil-Air units, the company offers the first portable compressors ever available with engines convertible from gasoline to oil or from oil to gasoline operation by making a simple substitution of fuel accessories and without changing heads or pistons. With this feature a user can convert his unit and take full advantage of the lowest fuel cost prevailing in the particular area where he is operating.

Portable compressor with automotive steering.

This engine is the Waukesha multi-fuel engine built to Ingersoll-Rand specifications. On gasoline it operates as a new type high-economy engine and employs the same high-turbulence combustion chamber used in the Type H oil engine. It is claimed that this results in a new oiling sytsem for its gyratory crushers. larly at part loads. On fuel oil, the engine operates like the familiar easy-starting, low-compression Hesselman type.

Crusher Oiling System

The Kennedy Van Saun Manufacturing & Engineering Corporation has recently adapted a remarkably low fuel consumption, particu- This forced feed, pressure-type lubricating method is said to be giving excellent results in actual performance.

Note from the isometric sketch showing general arrangement of the oiling system, that the oil pump is arranged for V-belt drive from the crusher, and is located below the external tank so that the pump is always primed. From the pump the oil goes to a filter, then through the filter and pressure line to the crusher. The oil is delivered under pressure to the crusher through stuffing box which provides a seal and prevents leakage. Thus clean, cooled oil is delivered to the crusher bearing under pressure to lubricate positively.

The oil enters the crusher at the bottom of the shaft under pressure and is forced up through the bearing surface between the main shaft and the ball for eccentric, then spills out over the top of the ball and returns through the eccentric to the chamber in the bottom driving disk. From here it is taken up by capillary action to the circular oil trough, and returned by gravity to the external oil-cooling tank.

The diaphragm-sleeve chamber of the bottom plate is fitted with an over-flow pipe so that in case the oil reaches above the top of the eccentric, this excess oil will automatically drain back by gravity to the external oil cooling tank.

A by-pass is provided in the pressure line between the pump and the filter so that oil flow may be partially by-passed to external tank if it is desired to cut down the amount of oil being delivered to the crusher.

In the pressure line between the pump and filter, an indicating pressure gauge is installed to show the pressure at which oil is being delivered by the pump to the filter and crusher. In addition, an electric oil-pressure switch is installed in the pressure line from the pump so that if the oil pressure is below a certain predetermined pressure, the switch actuates an industrial "howler," sounding an audible alarm to warn the operator.

Another feature of the new Kennedy lubricating system is the use of flexible hose for a portion of the piping arrangement, which facilitates its installation more so than the previous method utilizing metal pipes.

The external oil tank is provided with a cooling coil through which water is passed to serve as a cooling medium, thus maintaining the oil at a safe temperature.

Resistor

A line of noncorrodible neutral grounding resistors for outdoor service, designed particularly for applications where dirt, fumes, and extreme weather conditions are encountered, has been announced by the General Electric Company. Among the applications of such resistors is grounding the neutrals of transformers supplying power to shovel sets.

The resistance element, of special stainless-steel alloy, is corrosion-resistant, mechanically strong, and tough; suitable for operating temperatures up to 750 degrees C. above ambient; and is edgewise-wound in the form of a helix. A large factor of safety is provided against burnouts. The specific heat of stainless steel is approximately 50 per cent. higher than that of cast iron, and radiation at 790 degrees C. is much greater than from a cast-iron grid operating at a maximum of 540 degrees C.

The resistor units are mounted on strong, heat-resistant, noncarbonizable, ceramic-type insulators.

Respirator

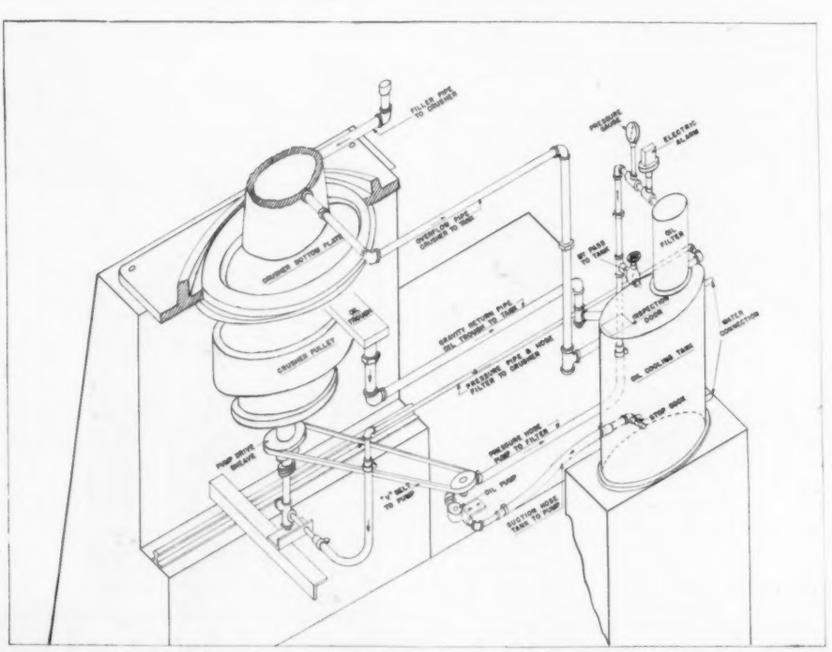
A new respirator, said to incorporate increased comfort and fully efficient protective features, is announced by Chicago Eye Shield Company.

Called the Cesco No. 94 Healthguard Respirator, the unit carries a recently issued approval by the U. S. Bureau of Mines (Approval Number BM-2142), for protection against type A (silica), lead and nuisance dusts.

Outstanding among improvements claimed for the new respirator is the manner in which the soft-molded rubber face piece fits low on the nose. This feature is said to eliminate obstacles to vision and enables the user to wear spectacles or goggles in conjunction with the respirator.

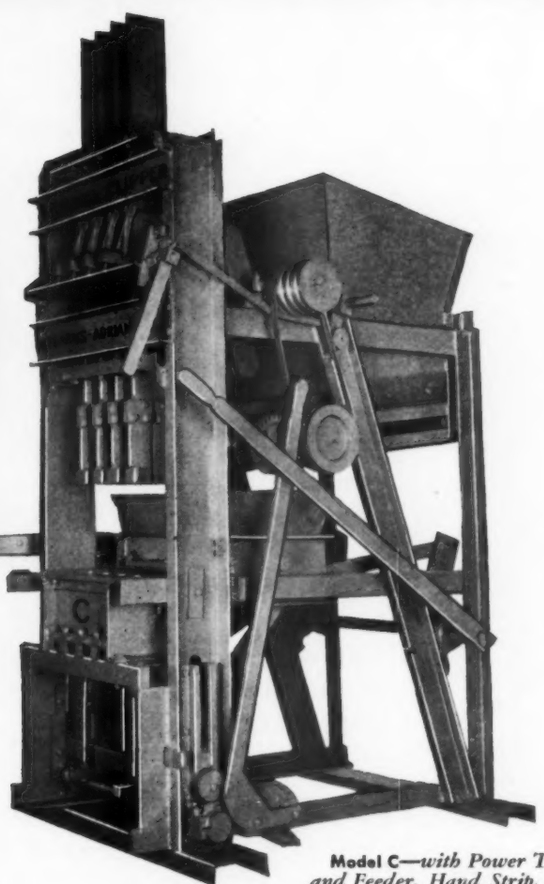
New respirator with filter area of 40 square inches.

Operating features include a specially-designed metal filter box that guards replaceable filters, with an over-all filtering area of approximately 40 square inches to promote easier breathing.



Isometric sketch showing arrangement of the oiling system.

STEARNS CLIPPER STRIPPER has 3 IMPORTANT FEATURES —here they are



Model C—*with Power Tamper and Feeder, Hand Strip, Strike-off and Off-Bearer.*

High Quality of Block

Stearns alternate-drop 8-bar tamping action insures uniform, dense block. Feeding and tamping adjustable to aggregate and product.

High Production Per Man

Clipper Stripper produces more blocks per man per day than any other machine with comparable power operation.

Low Initial Investment

Start with Model E and progressively add power attachments, until you have "All Power", never sacrificing equipment previously purchased.

Write for folder describing all Clipper models and attachments

Stearns Mixers have interchangeable, replaceable bar-type liners

STEARNS

Manufacturers of the famous Joltcrete Block Machines

The CONCRETE MANUFACTURER

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The CONCRETE MANUFACTURER

August, 1941

A SPECIAL SECTION OF PIT AND QUARRY DEVOTED TO PRODUCTION MARKETING AND USES OF CONCRETE PRODUCTS AND READY-MIXED CONCRETE

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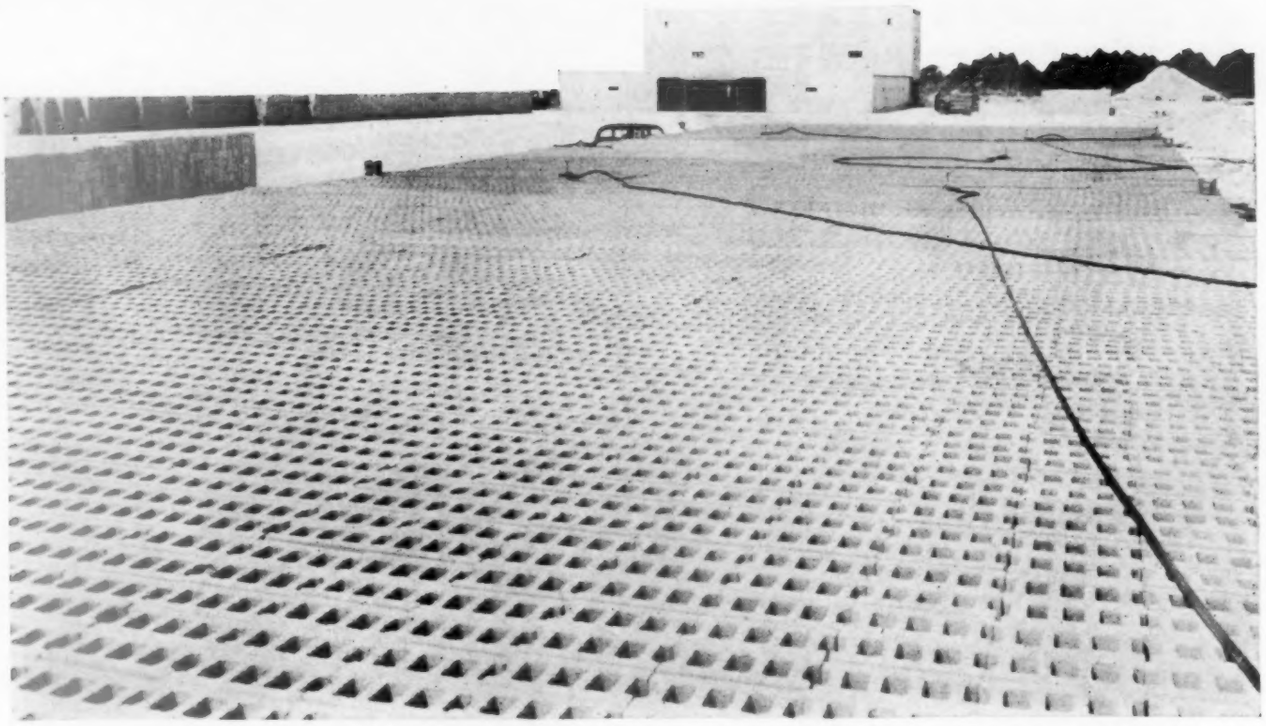
This Truck-Trailer Unit Travels 300 Miles Daily

ABOVE: The trailer at the gravel plant with a load ready to go. RIGHT: Dumping the load at the block plant. Note position of wheels.

AGGREGATES used at the plant of the Square Deal Cement Block Company in Detroit are being supplied by a single Ford truck and semi-trailer which operates on regular schedule between the block plant and a sand-and-gravel pit near Utica, Michigan—25 miles distant. The trailer, especially built for the job by the Highway Trailer Company, has a short wheelbase, carries 10 cubic yards heaped measure, and the entire load is dumped by a mechanical hoist into the receiving hopper reached by a driveway up a ramp at the block plant. As

(Continued on page 72)

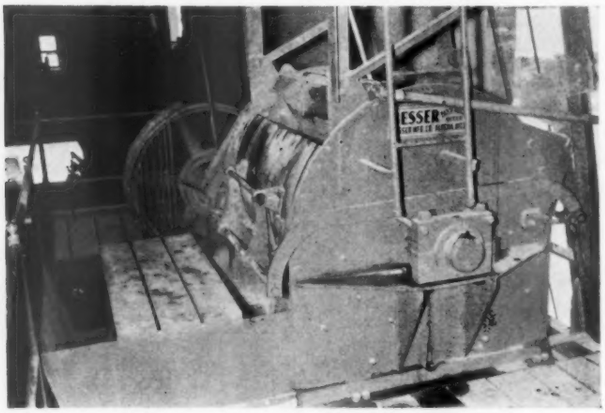
Plant and yard of the Square Deal Cement Block Company.



The storage yard at the new concrete-block plant of Maule Industries in Florida already had a capacity of 500,000 units when this photograph was taken early this year. It has since been enlarged to accommodate 750,000 blocks in storage.

This view shows one of the complete new production-machine installations.

One of the gasoline-powered lift trucks preparing to transport a rack-load of freshly-made blocks to the curing room.



The 40-cubic foot batch mixer located above one of the block machines.

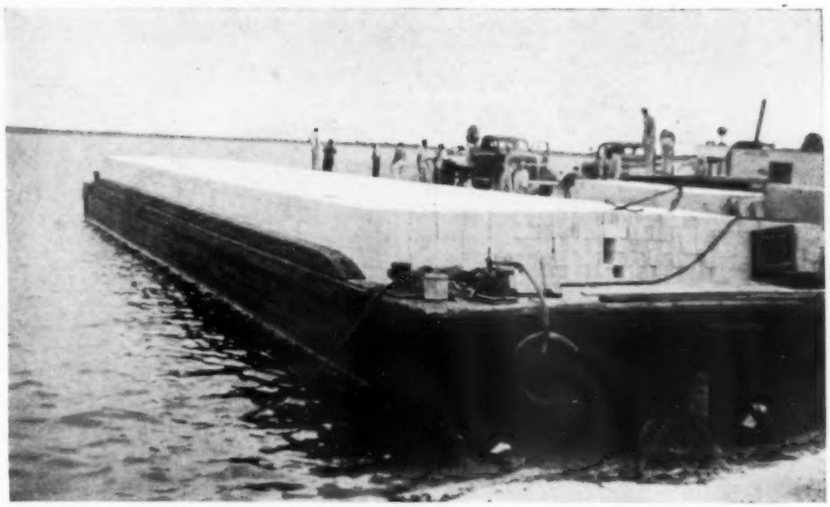
New Block Plant of Maule Industries Increases Capacity by 50 Per Cent.

WHEN a concrete-block manufacturer produces and sells over 8,000,000 blocks in a year and then has to build a new plant for additional capacity, that is indeed something to talk about. That, however, is what was done by the Maule Industries, Incorporated, of Miami Beach, Florida. Its plant at Ojus, Florida, a few miles north of Miami, has for years been probably the largest producer of blocks in this country, and in 1940 its output mentioned above was over half of the total production in this area. This plant, with 11 tamper-type machines, had a capacity of about 2,300 blocks per hour. A complete description of this plant was published in the November, 1939 issue of PIT AND QUARRY.

The new plant, about one mile west of Ojus, was built primarily to provide additional capacity, but also to make possible the production of a better block at a lower cost. Two of the latest-type vibrating block machines are used, one of which went into operation in October, 1940, and the other on April 1, 1941. The hourly capacity of this plant is about 1,200 standard blocks per hour. The first machine alone made 2,200,000 blocks up to April 15.

The new machines make it possible to get any desired texture. Absorption is held well under 8 per cent. but it can be held as low as 3 or 4 per cent. with some loss of adhesion. A total of 19 blocks is being made per sack of cement and the average compressive strength is over 1,600 pounds per square inch of net area. These machines also make a smoother, sharper, more saleable block and culls amount to only 1/10 of 1 per cent. of the output instead of 1 per cent. as in the old plant. For this reason the block-tracing system described in the previous article is not needed at this plant.

The aggregates for the new block plant are supplied from the company's No. 2 plant, across the highway from it which was built 3 years ago. The aggregates used are rock screenings and pebble rock up to ½ inch in size. At present they are being discharged from trucks to piles at the block plant and wheelbarrows are used to feed the two 40-cubic foot skips. Later aggregate hoppers, into which trucks will discharge their contents direct, will be installed. The skips will be divided for the two aggregates and will be loaded through gates controlled from the mixer floor. Agitators and belt-feeders will insure free flowing of the sand into the skips which will be in pits 12 feet under ground level. This plant is built entirely of concrete blocks and steel and can be added to at any time.



One of the barges loaded with blocks made in the Maule plant ready to be towed from Miami to Key West for use in a naval defense-construction project.

Cement is dumped into the skips from sacks which are stored on a wooden platform between the two block machines. The two skips discharge the aggregates and cement into the 40-cubic foot Besser mixers over the two Besser Super-Vibrapac block machines. Mixing water is measured by automatic meters. The block machines use plain pallets and are entirely automatic. The only labor involved in their operation is that required for bringing pallets and taking away the blocks. Each machine can make three standard 8- by 8- by 16-inch blocks at one time or six 4-inch partition tiles.

Besser-Shaw Box off-bearing hoists remove the blocks from the machines and place them on welded-steel racks which hold 72 standard blocks each. Clark gasoline Truc-Lifts haul the loaded racks away and bring back empty racks. The indoor storage has a capacity of about 15,000 blocks. After 12 hours of indoor curing the loaded racks are hauled to outdoor storage by the gasoline lift trucks. There they are sprinkled for 2 weeks for further curing but are not shipped until they are 28 days old.

The outdoor storage system at present has space for 500,000 blocks. This area is served by 10 concrete walks each 400 feet long. These walks are spaced 40 feet apart and incline a downgrade 2 feet in 400 feet away from the plant for drainage and for easier hauling of the loaded racks. Six more walks are now being installed to increase the storage capacity to 750,000 blocks.

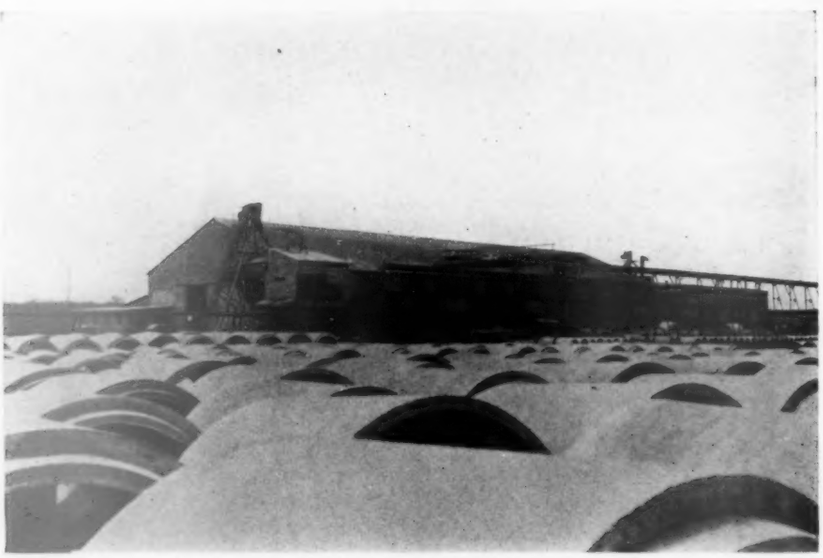
The new block plant is being used almost entirely for the manufacture of standard blocks and the few necessary specials and is kept operating at capacity. The old plant is now used chiefly for the manufacture of 3-, 4- and 6-inch specials, wall tiles, etc., but also acts as a reserve capacity for the manufacture of standard blocks. During the rush season it is necessary to operate this plant at capacity also. Nothing has been changed at this plant since it was last described and the concrete brick, marble and other special products are still made there.

There has been no let-up in the building "boom" in the Miami area and the prospects for private building during this year are very bright. Fewer new hotels are being built than in recent years, but home construction is at a peak. Several large housing jobs are planned and others are in prospect. Concrete blocks are now used in 90 per cent. of the buildings erected. This company is now filling an order for 180,000 blocks for naval construction at Key West. These blocks are loaded at the company's dock near the old plant on barges which hold 9,000 blocks each.

By W. E. TRAUFFER

UNIVERSAL'S PIPE PLANT AT COLUMBUS

A general view of the yard and plant at Columbus. The smaller structure at the right is devoted to the production and curing of machine-made pipe. The larger building at the left is used to manufacture pipes, forms and related equipment.



Another yard and plant view showing the outdoor mixing plant, where poured pipe are produced. Overhead crane runway is also shown.

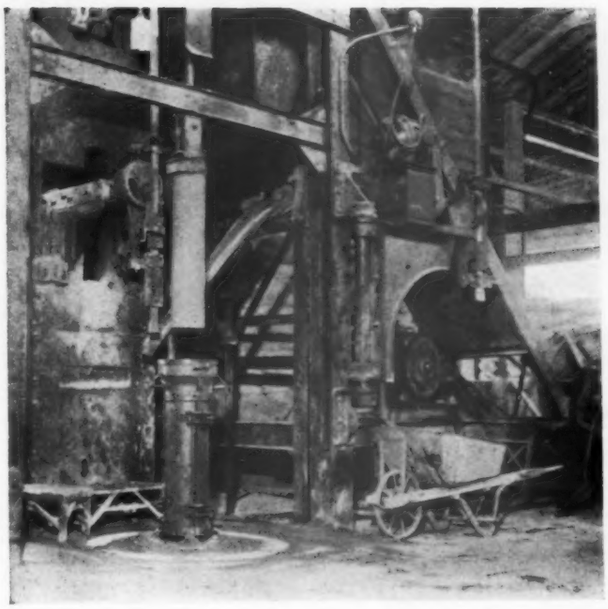
One of the four 25- by 100-foot steam kilns in which the machine-made pipes are cured. Pipe carts of the type shown are built by the company, as are also the steel molds.

THE Universal Concrete Pipe Company has been a dominant factor in the concrete-pipe industry for many years. At present 13 plants make up the chain, being located at Columbus, Cleveland, Zanesville, Youngstown and Sandusky, Ohio; Pittsburgh, Norristown and Warren, Pennsylvania; Atlanta, Georgia; Worcester, Massachusetts; Dover, New Jersey; Port Washington, New York; and New Martinsville, West Virginia.

Both machine-made and poured pipes are produced in these plants. The home office of the company is at Columbus, as are also the shops where the equipment is manufactured. All equipment used in the plants is built by the company. It is also sold and leased to independent pipe makers.

Views of the Columbus operations are pictured on these two pages. The large building contains, for the most part, the shops which manufacture Universal pipe machines, steel forms for poured pipe, and accessory equipment. Machine-made units are made inside the building at the right with a Universal tamping machine and are cured in four 25- by 100-foot steam kilns. Large-diam-

Tractors are equipped with winches driven by power take-offs for loading pipes onto the beds of the semi-trailers.



This pipe machine in use at Columbus is the type the company builds for its own use, and for sale to independent operators. When this picture was taken, it was turning out 8-inch bell-and-spigot sewer pipe.

Elevator and storage silos for aggregates. The batching equipment, housed in the concrete-block wing shown, loads a monorail car which charges the mixer seen at the right in the picture at the left.

eter poured pipe are made outside the building, a Smith tilting mixer producing the concrete which is distributed by batch cars and poured into the forms from a elevated track. A 5-ton overhead electric crane handles the forms and heavy pipe sections. A 72-inch section, for example, weighs about 7,300 pounds. International trucks and special flat-bed semi-trailers are used to make deliveries.

H. Eschenbrenner heads the company. I. A. Heinzman is superintendent at Columbus.

A view in the machine shop. Shown are two boring mills used principally to machine end-rings and pallets for large-diameter pipe forms. The machine on the left can handle work up to 5 feet in diameter; the one on the right, up to 11 feet.

The 5-ton electric overhead crane is also used at times to load large pipe sections onto the semi-trailers in the manner illustrated.

One of the flat-bed trucks loaded with three sections of reinforced-concrete pipe 72 inches in diameter, the total weight being nearly 23,000 pounds.

Square Deal (from page 67)

the trailer body rises to the dumping position, the body moves forward, the truck and trailer wheels coming in contact, as one of the pictures shows. Loading by clam-shell crane at the gravel plant and unloading require but a few minutes time each, so the unit is "on the move" much of the time. The outfit makes six round trips daily, a total of 300 miles, and delivers 60 cubic yards of material per day.

The block plant was recently improved by the installation of a Stearns Model 9 Joltcrete machine which is

The vibration block machine.

now the chief production unit, making approximately 500 standard 8-inch units, or the equivalent, per hour. "Specials" and some regular blocks are also made on a Stearns power stripper. Since curing space and the yard-storage area are somewhat limited, high-early-strength cement is used almost exclusively. A 28-cubic foot Stearns batch mixer supplies the Joltcrete with concrete, while the stripper is served by a Kent continuous mixer. A Clark gasoline-powered TrucLift handles the loaded and empty racks.

The continuous mixer which supplies concrete to the stripper.

The Square Deal Cement Block Company has been in production continuously during the last 14 years, the plant being located at 14811 Meyers Road on Detroit's west side. Sales are made through dealers and direct to the consumer. V. LoCicero is president and general manager.

Prices of concrete blocks have become quite firm and generally satisfactory to producers in recent months in the Detroit area. Standard 8-inch units are being delivered for 12 cents, with practically no price-cutting being reported. This is in marked contrast to the demoralized condition prevailing a year or two ago when units sold for as little as 7 cents.

Equipment Shipped to New Bermuda Air Base

Three Stearns Clipper strippers, mixers and skip-loaders were shipped to Bermuda late in June by the Stearns Manufacturing Company where they are to go into service manufacturing concrete blocks to be used in the building of United States naval and army air base on the island.

The Bermuda base is one of several acquired many months ago by President Roosevelt from Great Britain for the outlying defense of the United States.

• Racks and Cars

All-steel racks and rack cars for handling concrete blocks have many definite advantages, as experienced operators can testify.

One of the prominent makers of such equipment, the Chase Foundry & Machine Company of Columbus, Ohio, is currently stressing the low cost and low upkeep of this equipment. The company supplies racks and cars in standard sizes or builds them to specifications to meet individual requirements. Its engineers can be of considerable assistance to concrete-products manufacturers through recommendations of proper sizes, etc.

• Block Machine

Descriptions have just been received of the new Brikcrete Densifying machine, and a brief resume should have interest for those interested in the manufacture of concrete products.

This machine, built by Brikcrete Associates, Inc., of Grand Rapids, Michigan, utilizes the principle of high-speed core oscillation, the value of which is the providing of "multi-directional packing" to the walls of the units

The new "densifying" machine.

being manufactured, thereby securing the maximum of density and compressive strength.

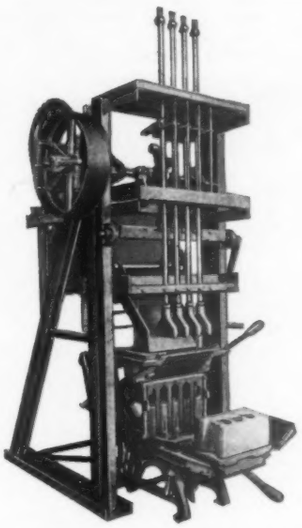
For the benefit of those not familiar with Brikcrete, it may be explained that this product is a cellular unit, with a large percentage of void for insulation value, and with extra wall strength to compensate for a large reduction of weight. It is claimed that the combination of light weight and ample strength is possible only through the special method of densifying the materials, and because of this the principle employed is all-important. While the same proportion as ordinary brick, Brikcrete is actually twice the size, thereby reducing the number of mortar joints in the wall and presenting a clean, symmetrical appearance.

Other than combining the principle of high-speed core oscillation, this new machine is marked by a number of excellent features pertaining to design and construction. The base is a massive casting, carefully machined, and which also serves as a housing for the oscillating mechanism.

• Spot-Welder

In the manufacture of concrete pipe and other concrete products requiring reinforcing mesh, extensive tests have proved the superiority of electric spot-welding of parts to be joined over the old method of tying. The greater durability eliminates cracking and prolongs the life of the product. Ruptures of concrete pipe usually occur where the steel reinforcement is joined by tying. The welding of the overlapping of the reinforcing eliminates this drawback and results in pipe of much greater strength.

The electrical spot-welding operation is very simple in ordinary operations, the Allan Manufacturing & Welding Company, Buffalo, originators of portable spot-welding apparatus, points out. Two pieces of steel are placed between two suitable copper electrodes, which press firmly upon the material to be welded. A large volume of current of low voltage is passed through the steel or iron material, the steel or iron, being a poorer conductor of electricity than the copper electrodes, instantly begins to heat; the hotter it becomes, the greater is the resistance to the passage of the electric current. When the welding temperature is reached, the current is turned off, through a switch in handle of apparatus, and at the same time, pressure is applied to force the particles of molten metal together (close-up welding operation) and completes the weld.



Recognized Everywhere

The Hobbs Jr. Face-Down Block Machine is recognized everywhere as the great general purpose machine of the concrete-products industry. Famous for its wide range of sizes and the variety of blocks it can produce. As illustrated, it is equipped with striking and finishing device, shown under the floor-type tamper and with power feeder.

Hobbs block machines, Anchor tampers, Anchor Jr. strippers, Stearns power strippers and Joltcrete, Stearns mixers, and Cast Iron and Press Steel pallets, Straublox oscillating attachments, etc. Repair parts for: Anchor, Ideal, Universal, Stearns, Blystone mixers and many others.

ANCHOR CONCRETE MACHINERY CO.
G. M. Friel, Manager — Columbus, Ohio

"NO KID GLOVE HANDLING"

Commercial Cored Pallets can be dropped, walked on, stored in wet places, stored in dry places, and nothing happens.

Treat any other kinds of pallets that way and see the results.

Commercial Cored Pallets need no kid glove handling in order to keep them in perfect shape for use at any and all times, and besides that they fit the core box; no filing, no grinding, no planing or sawing. When they reach you from our Plant they are ready to go right into the machine.

Why waste time and money on other types?

Write for our little folder, "Here's the Dope"

THE COMMERCIAL SHEARING AND STAMPING CO.
YOUNGSTOWN, OHIO

Ready-Mixed Directors Hold Midyear Meeting

The Board of Directors of the National Ready Mixed Concrete Association held its midyear meeting at the Palmer House, Chicago, June 25.

The position of the industry with reference to the demand of the International Union of Operating Engineers, that all ready-mixed-concrete trucks should carry an operating engineer in addition to the driver (*P&Q*, July, 1941, p. 31), was thoroughly discussed. The status of truck-owner-drivers under the Social Security Act was another subject of great interest. The effect of the Motor Carrier Act and the Federal Wages-and-Hours law on the industry's truck drivers was also discussed.

The problem of what should be done about the association's policy with regard to truck-mixer specifications and the granting of certificates to the manufacturers of approved equipment was given considerable thought, and the discussion revealed the same appreciation of the importance of the question that has been apparent at previous meetings.

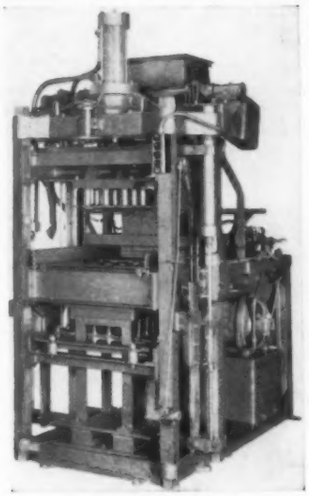
Among those present at the meeting were the following:

V. P. Ahearn, *executive secretary*, Washington, D. C.
H. W. Cormack, Certified Concrete, Ltd., Auckland, New Zealand.
Barney Devine, Chain Belt Co., Milwaukee, Wis.
J. H. Dixey, *president*, Transit Mix Concrete Co., Inc., New York, N. Y.
T. H. Fleming, Concrete Transport Mixer Co., St. Louis, Mo.
Alexander Foster, Jr., *treasurer*, Warner Co., Philadelphia, Pa.
Lion Gardiner, Jaeger Machine Co., Columbus, O.
Alexander Johnson, Central Concrete, Inc., Brooklyn, N. Y.
A. Levison, Blaw-Knox Co., Blawnox, Pa.
James F. McCracken, American Builders' Supply Co., Louisville, Ky.
Bror Nordberg, *Rock Products*, Chicago, Ill.
H. C. Peters, T. L. Smith Co., Milwaukee, Wis.
Stanley A. Phillips, PIT AND QUARRY, Chicago, Ill.
John Prince, Stewart Sand & Material Co., Kansas City, Mo.
George Renwick, Chicago Gravel Co., Chicago, Ill.
J. L. Shiely, Guaranteed Concrete Co., Inc., St. Paul, Minn.
Stephen Stepanian, *vice-president*, Arrow Sand & Gravel Co., Columbus, O.
H. H. Stewart, J. K. Davison & Brother, Pittsburgh, Pa.
H. F. Thomson, General Material Co., St. Louis, Mo.
Kenneth Vial, Chain Belt Co., Milwaukee, Wis.
Stanton Walker, *director of engineering*, Washington, D. C.

Everist Disposes of Ready-Mixed Business

The Ready Mix Concrete Company of Sioux City, Iowa, has been formed by Roy A. Krage and Irving F. Jensen, and has purchased and will operate the plant formerly operated by L. G. Everist, Inc.

Why not BUY the LATEST FASTEST and BEST PRODUCTION BLOCK MACHINE



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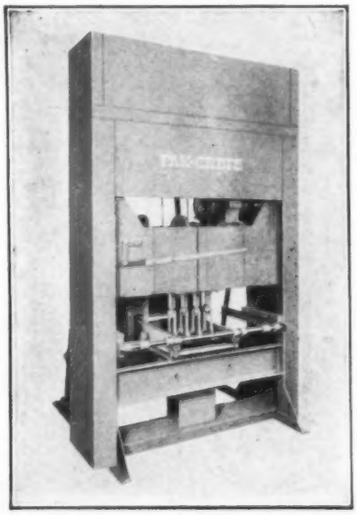
Write for information.

KENT MACHINE CO.
Cuyahoga Falls, Ohio

PAK-CRETE



The Efficient, Low Cost Block Machine *combining*

VIBRATION AND PACKING

For exceptional quality blocks at remarkably low cost—there's nothing like PAK-CRETE.

Write for Details—No Obligations

KRAMER PRODUCTS CO.
Industrial St., Peoria, Illinois

How You Can Solve HIGH PRICES and SHORTAGES

In essential materials used daily in tremendous volume by the building industry.

We equip you with special line production machinery—using local low-cost raw materials—only modest investment required—balance easy monthly payments.

Scores of established manufacturers have proven the quality and salability of product, as well as the earning power and stability of this business. (Names on request.)

This opportunity offered only one man in each community to make this proven low-cost material. (Samples furnished.)

Act now while your territory is still open. Write or wire for Free Books and learn how you too can own one of these profitable businesses.

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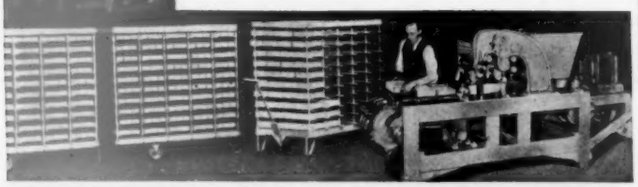

FOR SALE

BESSER STANDARD STRIPPER

Model 3 D-8 Mold with Automatic Pallet Feeder

This machine is equipped with a vibrator and is in good running order and is now operating and producing blocks at the rate of 6½ per minute. Molds are for units 7¾″ high by 15¾″ long and attachments are available for 2″, 3″, 4″, 6″, 8″, 10″, and 12″ blocks. Also manhole blocks, Samson tile, 8 x 8 and 8 x 12 chimney blocks, header blocks, all types of solid and hollow units, halves, quarters, straight ends and bull-nose blocks.

Also 5,000 plain steel pallets, ¼″ x 12¼″ x 18″ are available.

1—25 cubic foot Besser Mixer.

1—Peerless brick machine, which produces 10 bricks at a time and 2,000 steel brick pallets.

All of above equipment can be seen in operation any time up to Sept. 1st by appointment.

Equipment cannot be delivered until after Sept. 1st.

All or any part of above at bargain prices.

DOMINE BUILDERS SUPPLY CO. INC.

155-225 Gould St., ROCHESTER, N. Y.

QUINN PIPE FORMS

HAND or WET PROCESS

Make concrete pipe on the job with Quinn Pipe Forms. They can be handled by less experienced labor and produce uniform concrete pipe of highest quality. Quinn Pipe Forms make pipe conforming to A. S. T. M. requirements as to wall thickness and other standards.

Quinn Heavy Duty Pipe Forms are built to give more years of service — sizes for any diameter pipe from 12 to 84 inches — tongue and groove or bell end pipe — any length. Backed by over 30 years of service in the hands of contractors, municipal departments and pipe manufacturers.

HEAVY DUTY PIPE FORMS

Our Heavy Duty type with Adjustable Locks is shown above. Quinn Heavy Duty Forms are also available with a new wedge-type lock.

MEDIUM DUTY PIPE FORMS

Meet the demand for low cost equipment that produces a uniform quality of pipe in smaller amounts. For making pipe 12 to 60 inches in diameter —any length.

WRITE TODAY

Get complete information on prices and Special Construction Features of Quinn Pipe Forms. Give us size of job for estimate on your pipe form needs. Also manufacturers of Quinn Concrete Pipe Machines for making pipe by machine process.

QUINN WIRE & IRON WORKS 1627 12TH ST. BOONE, IA.

LOOKING FOR USED EQUIPMENT?

Refer to the listings in the Broadcast Section in this issue for a wide variety of used and surplus machinery and supplies.

ABSOLUTELY, YOU CAN MAKE MORE MONEY with JAEGERS

CHARGE FASTER
MIX FASTER
DISCHARGE FASTER

EITHER
HIGH DUMP
TYPE

Today's concrete production is going to Jaeger Truck Mixers, Agitators as fast as operators can expand their plants: (1) because the concrete industry has proof of the *higher quality* of material produced by the Jaeger Dual-Mix Drum; (2) because opportunities for comparison, on this year's gigantic projects, have proved beyond question that Jaegers, whether HIGH DUMP or Standard LOW CHARGE, can load, mix and discharge faster than any other mixers of their type.

Jaeger, alone, offers this higher payload production with standard 2-Speed Transmission (Separate Engine or Vacuum-Controlled Truck Engine Drive), One-Shot Top Loading, Vacuum-Controlled High Discharge Door, End-to-End Water Sprays and Mixing in Sealed Drums — *in the only line that completely meets every specification and operating demand.*

Combination Top or End Loading with Jaeger Hopper Attachment:

Specially adapted to older or temporary plants not equipped for fast ribbon loading. Permits top or end charging to meet conditions. Only end loader that does not constrict drum opening or require moving Hopper to discharge. Single turn of hand wheel opens Discharge Gate. No second seal to leak or wear.

OR
LOW CHARGE

A DRUM-FULL
— OR A CUPFUL
— AT A TIME

JAEGER PORTABLE HOPPER

Saves Truck Mixers Waiting—Means 25% More Payloads per Day on the Average Job.

Tows to job behind truck mixer —takes full 2 or 3 yd. batches. One hopper serves almost any job.

THIS HANDY BLANK BRINGS YOU FULL INFORMATION:

Complete 1941 Data, Models, Specifications, Prices, Terms

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Send us newest information on ☐ Standard LOW CHARGE Truck Mixers, Agitators, ☐ HIGH DUMP Models, ☐ Portable Hoppers, ☐ Auto-Pavers and Spreaders, ☐ Pumps, ☐ Mixers, ☐ Hoists, ☐ Carts.

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LOW INITIAL COST
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ONE OF OUR MANY DESIGNS

Chase "all steel" Block racks are bui't to suit your individual requirements. Our experience and engineering will give you a rack with the proper dimensions and arrangement for loading your product and the proper under clearance to work with your lift truck.

WRITE for Catalog and Special Low Prices

Complete line of concrete block cars, decks, Lift Truck Racks, transfer cars, turntables, dump cars, etc.

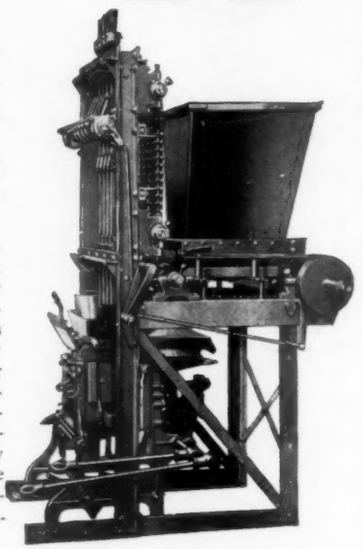
CHASE DRYER CARS & TRANSFER CARS
CHASE FOUNDRY & MFG. CO. COLUMBUS, OHIO

Miles CONCRETE EQUIPMENT

simple as A B C

It isn't how MUCH you invest that counts, but WHAT YOU EARN on your investment. MILES Concrete Products Plant Equipment will insure increased output, at lower first cost and lower operating cost.

MILES equipment is simple in construction, yet ruggedly built for the severest kind of service. Expert mechanics are unnecessary . . . any workman can keep your MILES equipment operating in first-class condition at all times. Investigate! Get the facts now . . . write for a complete catalog of MILES machinery for the concrete-products plant.



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SPOT WELD YOUR MESH!
FOR GREATER STRENGTH

Welding cages with ALLAN Portable Welding Machine

with ALLAN Portable Spot Welder for welding concrete pipe reinforcement. This FAST, EASY, SURE, ECONOMICAL method *Reduces the Cost of the product.* Write for details

ALLAN MFG. & WELDING CO., Inc.
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STORAGE BINS

- Super strength, diagonal locking stave construction.
- Immediate erection.
- Wide range of sizes.
- Easy dismantlement.
- Thousands in service.
- Write for details.

THE NEFF & FRY COMPANY
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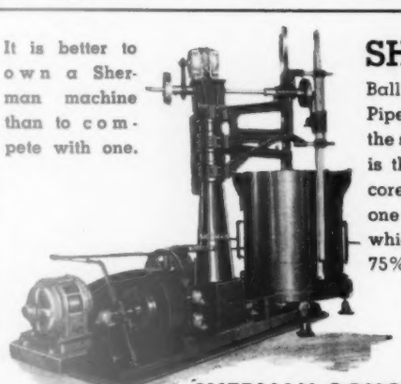
It is better to own a Sherman machine than to compete with one.



SHERMAN'S

Ball Bearing Concrete Pipe Machine, showing the sectional core which is the most economical core. By replacing only one section at a time which is a savings of 75% to the user.

Write for Prices and Information

SHERMAN CONCRETE PIPE CO.
KNOXVILLE, TENN.

MILLVILLE IRON WORKS, Inc.

SAND DREDGES
DREDGING PUMPS
STEAM COIL DRYERS
ROTOR DRYERS
GRAVEL SCREENING PLANTS

MILLVILLE, N. J.

Sorry—

We'd like to show you how Butler builds for Defense but...

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photographs are "out" for the duration.

We'd like you to see the plants that will turn out concrete faster than it has ever been poured before on drydock construction. We'd like to show you the Butler plants working on every phase of the national defense program—air bases, ordnance depots, cantonments, factories, TNT plants, naval supply depots.

And we'd like you to know that on every big drydock project east of the Rocky Mountains, Butler plants furnish the concrete at unprecedented speeds. At Charleston, Portsmouth, Philadelphia, Bayonne, Brooklyn, and Boston, the Navy has turned to Butler equipment.

Whether you need a central mixing plant for a monster dam, or whether you are interested in a small concrete products plant, consult Butler engineers. It pays to have the best.

Write to—

BUTLER BIN CO.
WAUKESHA, WISCONSIN

FLUE BLOCKS

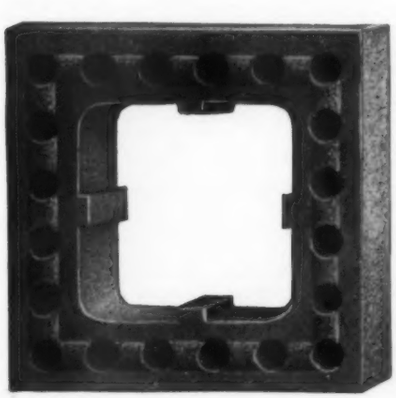
FOR FIRE-PROOF CONSTRUCTION

A big paying market and a low-cost product

when they are

MULTIPLEX-Made

Write for our Catalog No. 41 for full details about the MULTIPLEX Line.



The housing boom and industrial expansion mean *new opportunities* and *extra profits* for concrete products manufacturers. Builders and contractors are demanding "Made-by-Multiplex" flue blocks to insure economically produced units that meet every strength and safety specification in chimney construction.

MULTIPLEX concrete blocks are available in the following types: Standard Ventilated Type; Solid Type for Flue Liners; Light Weight Type for Flue Liners; the new 16" x 16" Ventilated Type for round Flue Liners.

All MULTIPLEX flue block machines now operating can be re-fitted to make the new type units.

Better Chimneys and Better Profits are BUILT WITH MULTIPLEX!

The *Multiplex* CONCRETE MACHINERY CO., Elmore, Ohio

The CONCRETE MANUFACTURER

Don't GAMBLE!
Why take chances with new and untried truck-mixers? Play safe! Buy SMITH-MOBILE! It's the ORIGINAL High Discharge Truck Mixer, thoroughly job-tested and backed by more than 40 years' mixer building experience. Now entering its 5th year of quantity production, Smith-Mobile has won the approval of ready-mixed operators, everywhere. Hundreds of machines are giving satisfactory service and hundreds more are being re-ordered by enthusiastic users. Get the complete Smith-Mobile story. Ask for Catalog 198-A.
The T. L. SMITH COMPANY
2887 N. 32nd Street • Milwaukee, Wisconsin
HIGH DISCHARGE
27" to 34" higher than old-style truck-mixers. No hoist or ramp required. Pour concrete directly into high forms, buckets or carts.
READY MIXED CONCRETE
SMITH-MOBILE
The Original High Discharge TRUCK MIXER and AGITATOR
A 3441-½H

THERE are many reasons why SAUERMAN Scrapers and Cableways show such good profits for their owners on a variety of excavating and stockpiling work. Here are the chief reasons—note them well:

1. These machines combine digging, hauling and dumping into one straight-line operation.
2. They handle any class of material with facility.
3. They move a given yardage in shorter time than any other machine of equal cost.
4. They require but a single operator.
5. Power requirements are light.
6. Maintenance costs are moderate.
7. Original equipment cost is lower than any comparable machine.

Capacities up to 1000 tons per hour.
Operating spans up to 1500 feet.

SAUERMAN BROS. INC.
434 S. Clinton St. Chicago, U. S. A.

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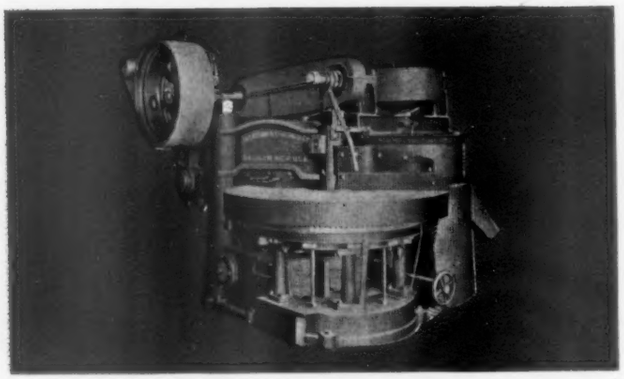
"It's really a BRICK!"

THE "J & C" PRESS

makes *better* Concrete Brick



Users say that they can make high quality concrete brick *faster* and *cheaper* on a "J & C" automatic machine.

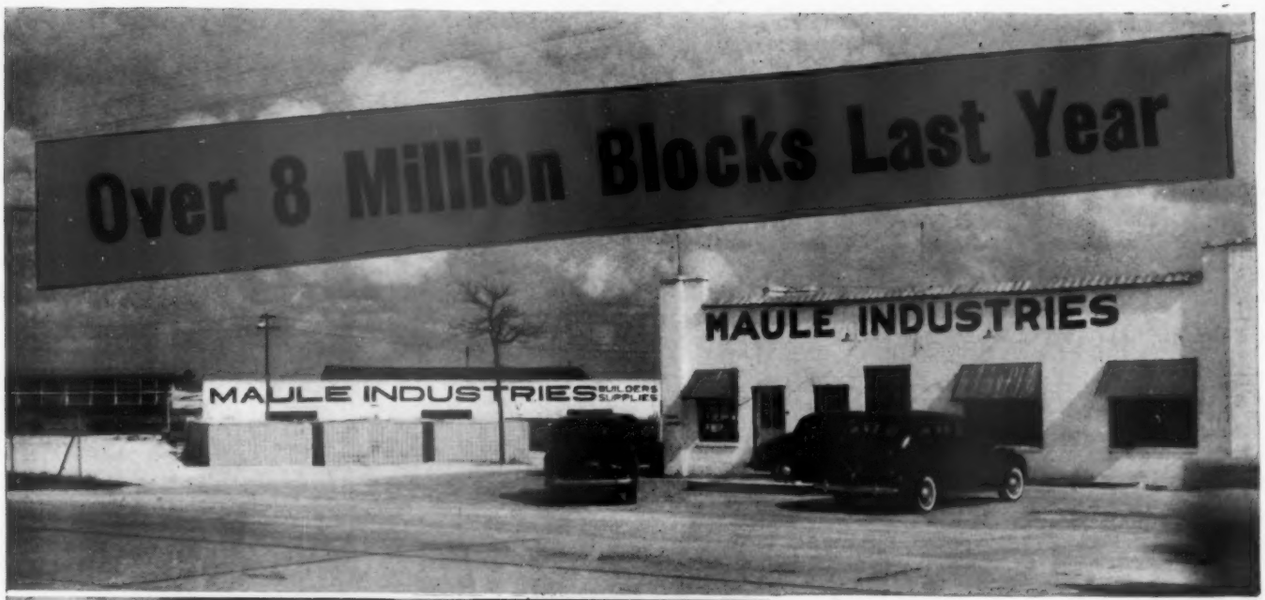
All brick are accurately sized—have clean, uniform edges—are smooth textured, and high in strength.

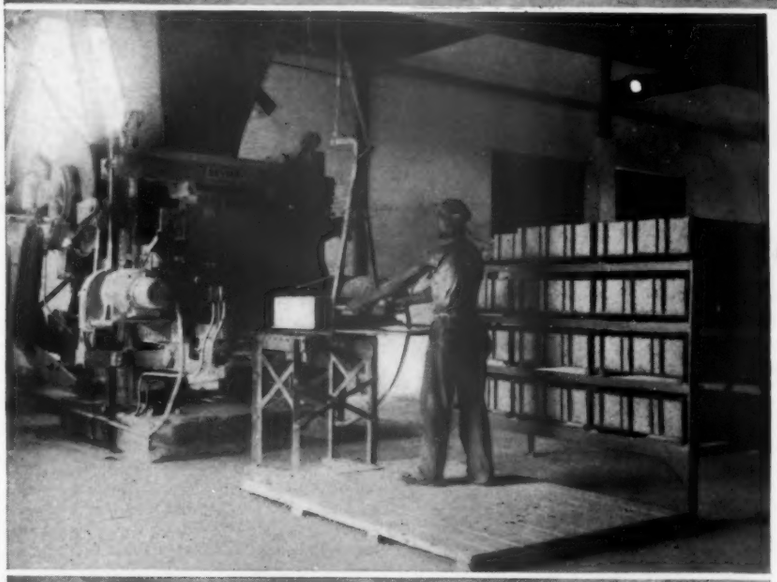
Brick can be produced either vapor cured or high pressure cured. High pressure steam curing eliminates expense of yard stocking and aging. NO PALLETS USED.

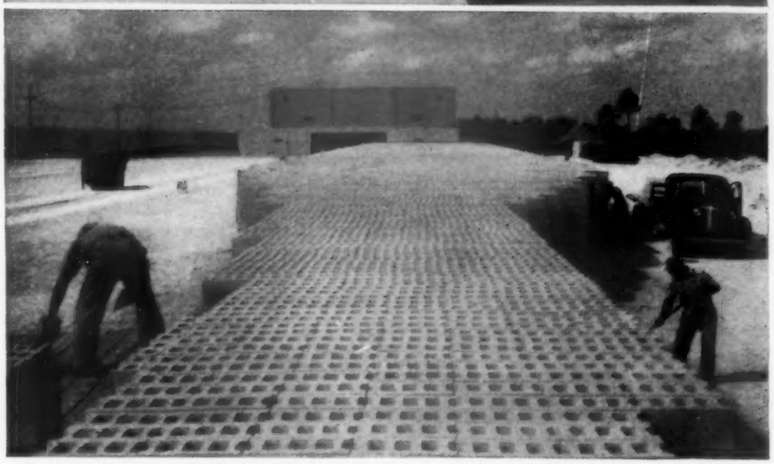
Capacity of "J & C" Model "A" Machine, 3200 brick per hour. Capacity of Model "C" Machine, 1600 brick per hour.

Write for Information.

THE JACKSON & CHURCH CO.
Saginaw, Michigan







STOCK YARD WITH 150,000 BLOCKS

Maule Industries of Miami, Florida (plants at Ojus), chose Besser Super Automatic Vibrapacs to meet increased production demands due to extensive building programs in Miami and surrounding area. They installed one Vibrapac last spring and now have a second one of the same model to provide for the still greater demand for Superior Quality blocks which Besser Vibrapacs produce.

The trend the country over is toward Besser Plain Pallet Vibrapacs and Besser Plain Pallet Tampers for increased production (100% Automatic Machines)—Greater Economy (Saving in pallet cost and saving in production cost)—A Better Product (Fully Pressed Top Units).

Eight models—Vibrapacs and Tampers—A capacity for any size plant.

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BESSER MANUFACTURING CO., ALPENA, MICH.

508—41st Street

THE SAVING IN PALLET COST PAYS FOR A BESSER PLAIN PALLET VIBRAPAC

The CONCRETE MANUFACTURER

- **Complete, accurate and up-to-the-minute Directory.**
- **Hundreds of new names; others checked and revised.**
- **Alphabetical by companies; geographical by plants.**
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Don't Waste Your Time and Postage on an Old List

The compilers of the 1941 Directory Section of Pit and Quarry Handbook have labored painstakingly to build an accurate list of all known American producers of nonmetallic minerals. Each new listing has been carefully scrutinized for accuracy and completeness. Previous listings have been revised, checked, double-checked. All appear two ways—(1) alphabetical by companies, (2) geographical by plants. It gives you company names, officers, location of plants, size or capacity, and names of the men who do the buying. Select the complete Handbook *and* Directory, or the convenient, flexibly-bound Directory alone. Now ready for distribution. Order NOW to insure getting one of the first copies. Use coupon below . . . we'll bill you after you get the book.

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A prerequisite of the manufacture of equipment for any industry is a complete understanding of the problems and requirements of that industry. The reason underlying the phenomenal success of the Traylor Type TY Reduction Crusher is that the accumulated experience of Traylor engineers, throughout several decades, was brought to bear to produce a machine to eliminate all operating troubles while producing continuously and profitably.

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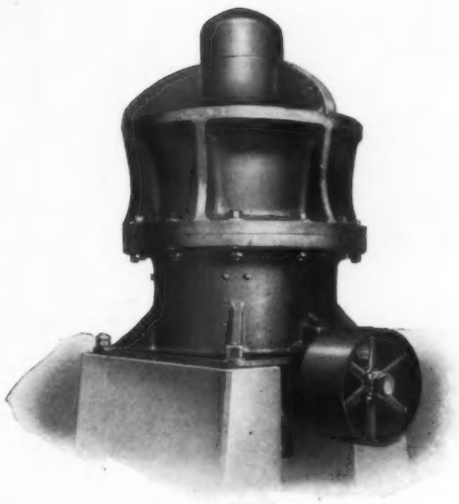
If you don't know the "TY," it will be very much to your advantage to get acquainted with it. Our new Bulletin 3112 is exhaustively descriptive, and our representative has records galore that are sure to interest you. Send for both of them, soon.



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Above: A 54" High Weir Type AKINS Classifier equipped with wash boxes and lifter blades for washing sand.

Deckers Creek Sand Co.

washes sand with

AKINS CLASSIFIERS

ADVANTAGES FOR SAND PLANTS—(1) Close separation for desired specifications; (2) Ability to handle big tonnage with very low power cost; (3) Starts without unloading—a great advantage for plants which do not operate 24 hours a day; (4) Mechanical simplicity.

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Deckers Creek Sand Co. uses one 54" and two 48" AKINS Classifiers in the company's sand plant at Greer, W. Va. We are informed that the product is a minus 20 plus 80 mesh sand for use in making glass.

AKINS Classifiers are in use all over the world—doing metallurgical classification, dewatering and washing. The Colorado Iron Works Co. is eighty-one years old.

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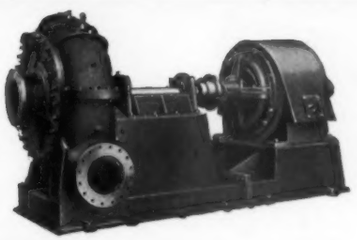

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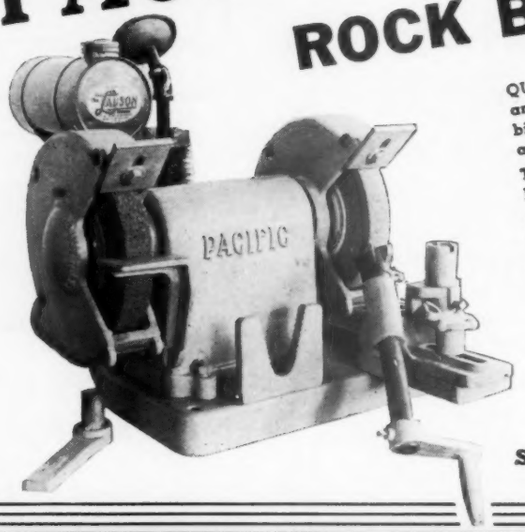
THE NEW G-8

PACIFIC Gas-Driven ROCK BIT GRINDER



QUICKLY restores proper cutting edge and gauge on 4-way detachable rock bits up to 3" diameter, anywhere and anytime.

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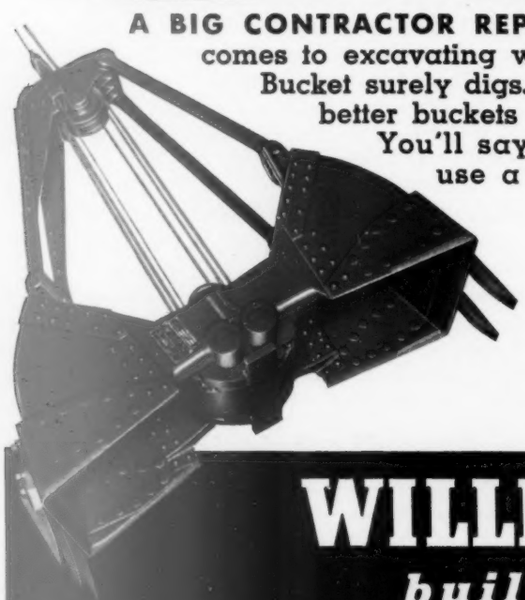
A BIG CONTRACTOR REPORTS: "When it comes to excavating work, our Williams Bucket surely digs. We don't believe better buckets are built." You'll say so too, once you use a Williams Bucket.



Williams Buckets and Parts are carried by distributors in all parts of the country. Bulletins covering Williams Power Arm, Multiple Rope, and Dragline Buckets sent on request.

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"I said it was the usual advertising bunk.

"But the boss is a tough guy who will always take a chance when he thinks he is going to win, so in came the rope and I put it on. When it got to the time when we usually change rope, that Wickwire Rope was going strong. Then I got interested because changing rope ties up equipment and is a dirty job. That's months ago and no sign of change yet. That Wickwire Rope is some rope!"

WICKWIRE ROPE

WICKWIRE SPENCER STEEL COMPANY

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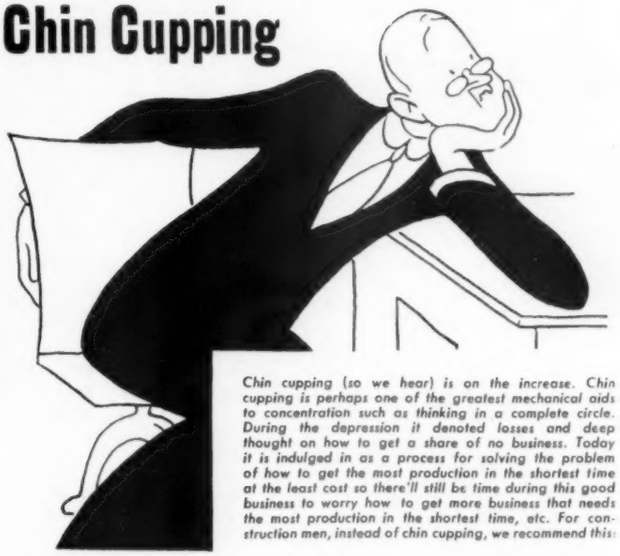
Chin Cupping



Chin cupping (so we hear) is on the increase. Chin cupping is perhaps one of the greatest mechanical aids to concentration such as thinking in a complete circle. During the depression it denoted losses and deep thought on how to get a share of no business. Today it is indulged in as a process for solving the problem of how to get the most production in the shortest time at the least cost so there'll still be time during this good business to worry how to get more business that needs the most production in the shortest time, etc. For construction men, instead of chin cupping, we recommend this:

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Let DIAMOND engineers consult with you on the type and size of DIAMOND equipment that will best serve your needs. The men who know will tell you that dollar for dollar no one can give you more up-to-date construction and simplified engineering. Fast, certain, uniform production and low operating costs are all-important elements of today's construction jobs. DIAMOND equipment offers you those elements whether it be a

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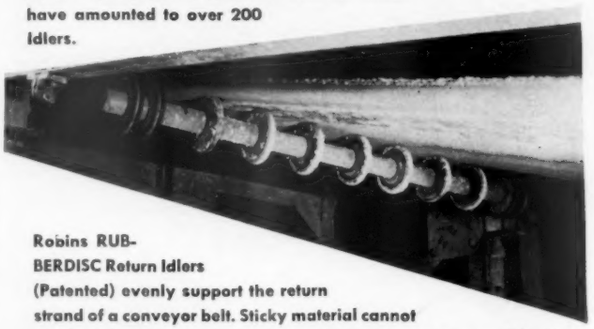
Customer A* agreed recently to try 8 RUBBERDISC Return Idlers, now he has 70. Customer B* started with 4 and has since ordered 230 more, while C* bought 2 at first and now has 125 Robins RUBBERDISC Idlers. Individual orders have amounted to over 200 Idlers.



Robins RUBBERDISC Return Idlers (Patented) evenly support the return strand of a conveyor belt. Sticky material cannot build up on the discs and this, plus the gentle "rubber to rubber" contact, protects the belt and prolongs its life. RUBBERDISC Idlers also withstand abrasive and corrosive action better than ordinary metal idlers.

*Write right to Robins. The names of these and other pleased RUBBERDISC Idler users supplied on request.

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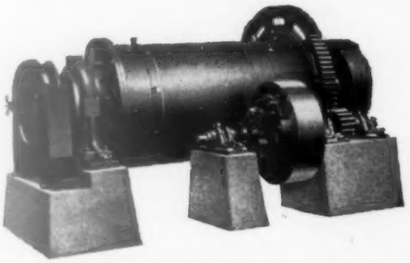

Deckers Creek Sand Co.
at Greer, W. Va. uses a 5'x10'
MARCY ROD MILL

Deckers Creek Sand Company's plant at Greer, W. Va., is one of the best equipped sand plants in the country. In the production of minus 20 plus 80 mesh sand for glass manufacture, this plant uses a 5'x10' Marcy Open End Rod Mill. The reported capacity is 900 tons per 24 hours. Marcy Open End Rod Mills, long widely known in ore milling, are finding increasing favor in many other specialized fields.

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WRITE TODAY FOR BULLETIN F-100 that shows how easy it is to repair rips, to strengthen soft spots and to put in patches by using Flexco HD rip plates. The bulletin also shows how to make tight butt joints in both conveyor and elevator belts with Flexco HD Belt Fasteners. These fasteners are made in six sizes. Furnished in special analysis steel for general use and in various alloys to meet special conditions.

Flexco HD Rip Plate

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EAGLE Recommends:

Avoid Costly Time Losses

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2 Be prepared for Emergencies. (Send for free copy of EAGLE Bulletin No. 41.)
3 Protect your material. If necessary . . .

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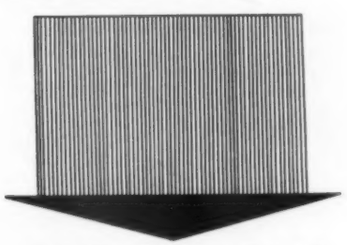

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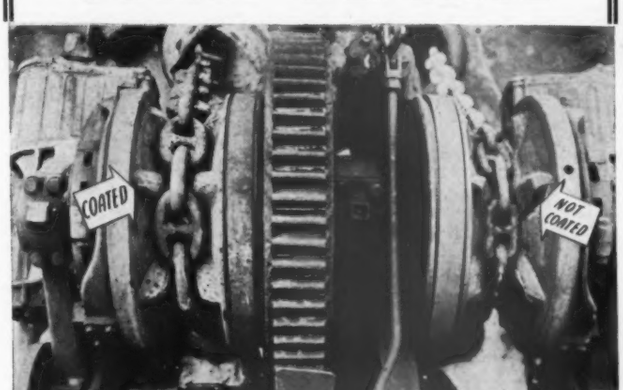

The Nicholson Terminal & Dock Co., of Ecorse, Michigan, armored the anchor lugs on their dredge boat with Coast Metal. (Above, left.) A similar anchor was employed uncoated (right). After one season's use compare the big difference in wear, and of course in saving!

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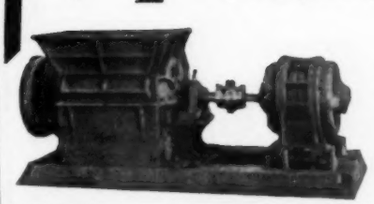

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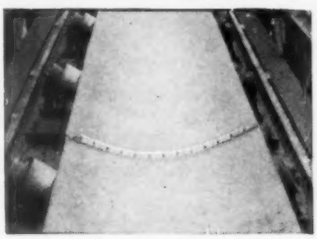

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Be sure that your production of agricultural limestone is correctly applied. Baughman spreaders will do it. Even distribution of limestone up to 40 ft. width is assured by the spreading action of a specially-designed revolving disc.

The illustration below shows two 7½ ton Baughman MAMMOTH limestone spreaders at work. Notice how the spread is held down to the ground where it belongs and also the width of the spreads. These two machines have spread thousands of tons of lime and are still going strong.

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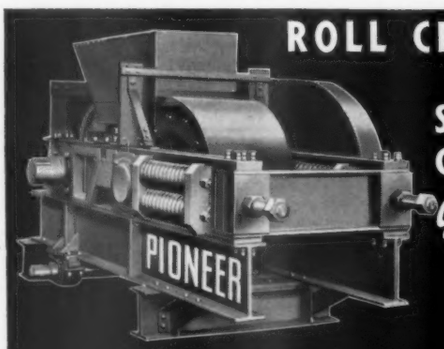

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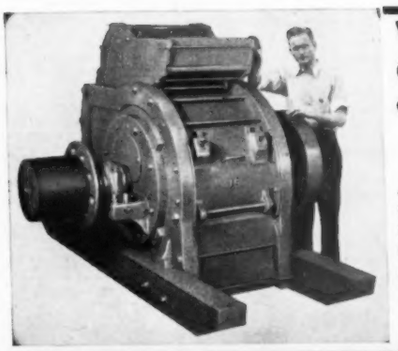

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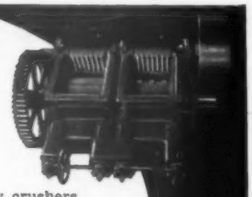
for ROCK—
SAND—GRAVEL



Single and double roll and jaw crushers, hammer mills, super dry pans, steel log washers and scrubbers, sand drags, revolving and vibrating screens, elevators, conveyors, dryers, jigs, hoists. Complete portable, semi-portable and stationary crushing, screening and washing plants for different capacities of any materials.

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SCHRAMM
AIR COMPRESSORS

Built in sizes ranging from 20 to 600 cubic feet. Can be obtained in any type mounting—Portable or Stationary.

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The President of the United States said:

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"to the owners of plants
"to the managers
"to the workers
"to our own Government employees

"to put every ounce of effort into producing these munitions swiftly and without stint. And with this appeal I give you the pledge that all of us who are officers of your Government will devote ourselves to the same wholehearted extent to the great task which lies ahead.

"We must be the great arsenal of democracy. For us this is an emergency as serious as war itself. We must apply ourselves to our task with the same resolution, the same sense of urgency, the same spirit of patriotism and sacrifice as we would show were we at war."

Let's get squarely behind our President's appeal. Let's work together building that "GREAT ARSENAL OF DEMOCRACY" in record time. Increase PRODUCTION! That's our No. 1 job! Let's go!

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SQUAROUND
HEXAGON
PERFORATED
PLATE
of every description
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Feeders	Grinders	Coolers
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Transmission—Conveyor—Elevator

"V" BELTS

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Pumps—Crushers—Pulverizers—Etc.

RUBBER HOSE

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AIR—WATER—STEAM—ETC.

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NEW AND HEAVY DUTY

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Quantity	Width	Ply	Type Cover	Bottom Cover	Type
500 Ft.	48"	8	1/8"	1/16"	Conveyor
505 Ft.	36"	6	1/8"	1/16"	Conveyor
856 Ft.	30"	6	1/8"	1/16"	Conveyor
520 Ft.	30"	5	1/8"	1/16"	Conveyor
180 Ft.	24"	6	1/16"	1/16"	Elevator
2305 Ft.	24"	5	1/8"	1/32"	Conveyor
1298 Ft.	24"	4	1/8"	1/32"	Conveyor
250 Ft.	22"	8	1/16"	1/16"	Elevator
1874 Ft.	20"	5	1/8"	1/32"	Conveyor
520 Ft.	20"	4	1/8"	1/32"	Conveyor
506 Ft.	18"	6	1/16"	1/16"	Elevator
1765 Ft.	18"	4	1/8"	1/32"	Conveyor
285 Ft.	16"	6	1/16"	1/16"	Elevator
1450 Ft.	16"	4	1/8"	1/32"	Conveyor
516 Ft.	14"	6	1/16"	1/16"	Elevator
509 Ft.	14"	4	1/16"	1/32"	Conveyor
420 Ft.	12"	6	1/16"	1/16"	Elevator
385 Ft.	12"	4	1/16"	1/32"	Conveyor

We will cut any of above rolls. Advise desired lengths and widths and we will promptly quote prices. Many other sizes in stock for immediate shipment.

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3x4' 1-deck Leahys
3x5' 1-deck Multitrap
3x5'1-deck Hummers
3x6' 1-deck Leahy
3x6' 2-deck Leahy
4x5' 1-deck Hummers
4x6' 2-deck Leahys
4x7' 1-deck Hummers
3x5' & 4x5' New Toncap & Hummer Frames.

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5"x32', 7"x32', 8"x32', 10"x35', 12"x35', 14"x 32', 14"x50', 16"x60' and 20"x40'
Chain, Buckets, Belt, Casings, Etc.

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18"x44' B-G & 20"x45' Portable Types.
14" to 36" wide Gravity Roller Sections.
14" to 36" Rubber Belt, Idlers, Pulleys, Gears, Shafts, Collars, Bearings, Etc.
24"x11', 18"x12', 30"x5', 30"x12', 36"x5' and 36"x18' Apron type Feeders.

CRUSHERS:

Jaw—10x4", 15x9", 18x12", 20x10", 24x13", 36x24"-B Farrel, 36x28 Traylor.
Gyratory—8" Traylor, Nos. 25 & 37 Kennedys.
Roll—54x20", 42x16", 36x16", 24x24".
Penna, Trojan Hammermill, 24x24".
2 11½ Sturtevant Ring Roll Mill.
Ross Crusher Feeder, 24", 13¾" Chains.

MISCELLANEOUS:

5/8 yd. Byers Gas Shovel, Skimmer Boom.
Clamshell Buckets—1-c., 3/4, 1¼, 1½.
2 Insley Concrete tymes, Bottom Dump.
50-ton Blaw-Knox Batcher Bin, 2-cpmt.
13-S Koehring Batcher Mixer.
2,000—5/8" Universal Form Clamps.
No. 7 Pile Driving & No. 2 Sheeting Hammers.
800 hp. Patterson Hot Water Feed Heater.

RAILWAY EQUIPMENT:

36" Whitcomb 8-ton & 4-ton Locomotives.
8—36" Koppel V-dump Cars, 3 & 4-yds.
30" Mercury Battery Locomotives, 2-ton.
5—24" Easton V-dump Cars, 1¼ yd.
6—24" Koppel V-dump Cars, 1 yd.
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1500' 24" Portable Track & Switches.

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1—3½ ton Plymouth Gasoline Locomotive, 24" Track Gauge, with Buda Engine, Model GTU.

1—Barnes Portable Triplex Pump, 3½x6, Model 2060, with Hercules Gas Engine.

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1—A.H. & D. Co. Stiff Leg Derrick—60 ft. boom.
1—65-Ton Switch Engine.
1—Allis-Chalmers 7 in. Newhouse Gyratory Crusher—50 HP motor.
1—Allis-Chalmers 48x8 Triple Deck Vibrating Screen—7½ HP.
6 Yard Western Side Dump Cars and parts therefor.
Kennedy No. 27, No. 6 and No. 4 Gyratory Crushers. 15-Ton Standard Gauge Davenport Steam Engines—Hoist Engines—67½ and 70 lb. Relayer Rail and numerous other quarry items.

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DEPENDABLE USED MACHINES

Speeder ½ yd. shovel and drag; rebuilt.
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P&H Model 206 shovel; low price.
Many jackhammers and paving busters.
Large selection of centrifugal pumps.
A-W No. 80 crushing and screening plant.
8-ton standard gauge gas locomotive.

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10B Comb. Shovel & Drag, ⅜ yard & trailer. Used by one man 2 yrs. Perfect. $4500.00.
1020 ⅝ Compl. B-E Gas. Eng. dragline, 35' Sect. Bm. full cab, crawler, bargain.
104 Northwest dragline 55' bm. drag. Bckt. machine very good condition. $2500.00.
7&10 Newhouse A-C & 10" & 20" McCully gyratory. 30 Cat. W. gauge perfect.

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DIESEL PLANTS for sale
Ranging from 15 KW. up
Immediate Delivery

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No. 80 Austin-Western Portable Crushing & Screening Plant.
36x60" Fairmount & 18x24" McLanahan single roll Crushers.
Traylor 30x30" double roll & type TY Reduction Crushers.
Superior 13, Kennedy 19, 258 & 36, Allis C 6 & 9 and Traylor 12x40" Gyratory Crushers, 2' Symons Cone.
8x36" & 15x36" Universal and 10x30" Champion roller bearing Jaw Crushers.
Two 6'x12' Ball Mills, silex lined with balls and drive.
Barber-Greene Loaders 24, 25, 42 & 82, Haiss 75.
Direct Heat Dryers—8x80' Ruggles Coles, 3x30' Vulcan, 3x22' North Star, 42"x24' Amer. Process.

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Reconditioned Shovels

P&H 300, No. 4144, Half Yard Capacity. Price $3800.00
Universal Tractor Shovel, Model B, ¾ yd. Cap. ¾ Swing. Price.....$1750.00

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1—Browning 10-ton cap. Electric Crawler Crane, 40' Bm.
1—Keystone Model—18-A full rev. Gas Crawler Backhoe and Skimmer 1¼-yd., new 1937.
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Speeder-Dipper ½ yd. also 2 belts of cats
In first class condition
Near North Adams, Mass.

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Jeffrey Type A 30" x 36" Roller Bearing. Rated Capacity 15-18 tons lime dust per hour. Complete with new set of Hammers. Outfit purchased new in January, 1941. Used only fifteen days. Price $2000.00.

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Model O Thew ¾ yard Shovel. Extra equipment. 40 ft. crane boom. Working condition. Price $1000.00.

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One Barber-Greene model 4 Ditcher.

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FOR SALE

One No. 5 Allis-Chalmers Gyratory Crusher, in first class operating condition.

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San Antonio, Texas

FOR SALE

1—Stiff legged steel derrick, 10-ton capacity, 40' mast, 75' boom, steel lattice construction, equipped with 3-drum Clyde hoist with independent swinger, and 1-cu. yd. Blaw-Knox clam shell bucket. Without motor.

1—Stiff legged steel derrick, 10-ton capacity, 40' mast, 75' boom, steel lattice construction, equipped with National 3-drum hoist with independent swinger, and 1-cu. yd. Blaw-Knox clam shell bucket. Without motor.

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RELAYING RAILS—Super-quality machine-reconditioned—not ordinary Relayers.
NEW RAILS, Angle and Splice Bars, Bolts, Nuts, Spikes, Frogs, Switches, Tie Plates, and all other Track Accessories.
Most sizes usually available from warehouse stocks. Every effort made to take care of emergency requirements. Phone, Write or Wire

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COMPLETE STONE CRUSHING
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SAND and GRAVEL PROCESSING SERVICES
available on tonnage basis

We will install NEW, MODERN portable or semi-portable plant in any practical location. Capacities 100 to 150 tons of stone per hour or 150 to 200 tons of sand and gravel per hour.
Estimates Furnished Without Obligation

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OLIVER FILTERS

3—Oliver Rotary Continuous Filters, 8′x10′, wood stave, closed steel head, steel trough, oscillating agitator, reduction gear drive, no motor, complete with receivers, pumps.

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1—36″ Style "N" Allis-Chalmers, short shaft.
1—16″ Telsmith No. 7.
1—30″ Superior McCully.
1—20″ Superior McCully.

GYRATORY REDUCTION CRUSHERS

1—1′8″ Traylor TY.
1—410-TZ, capacity 150 t.p.h. through 1¼″ square mesh; 10″ feed opening.
1—Kennedy No. 25 with motor in pulley.
1—Kennedy No. 49 with motor in pulley.
1—Kennedy No. 19, V-belt drive.

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30x42″ Buchanan Type "C"; 48x42″ Traylor Bull-dog; 66x86 Traylor; 36x24 Farrel; 18x36 Farrel; 24x36 Allis-Chalmers; 8x36 Universal Roll Jaw; 18x30 Allis-Chalmers and smaller sizes.

ROTARY DRYERS, DIRECT HEAT

Ruggles-Coles, double shell: 5′x26′, 5′x30′, 5′6″x60′, 80″x45′.
Single Shell: 4′x30′, 5′x30′, 6x40, 6x50, 6x60, 8x60, 8′8″x85.

ROTARY KILNS

6′x60′, 8′x110′.

CRANES

1—55B Bucyrus Erie Crane, Atlas Imperial Diesel Engine, Dragline Fairleads; 110 ft. boom; lifts 62,000 lbs. at 20 ft.
1—Lorain "95" Dragline, 2 yd., 100 ft. boom, "Caterpillar" Diesel.
1—Bucyrus Erie Steam Driven 50-B Crane, equipped with Pile Driver Fairleads; double drums, 75′ boom. Lifts 68,000 lbs. at 15 ft.
1—Marion No. 381 Crane, equipped with Waukesha-Hesselman Oil Engine; 75′ boom.
1—Class 17 Clyde Whirley. Lifts 30 tons at 30 ft.

AIR COMPRESSOR

1—Ingersoll-Rand No. 315-A, driven by Hesselman Oil Engine.

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32″x15″ Penna. SX-2, 4x1″ hammers, adj. grate.
36″x24″ Gruendler No. 4XA, 60—3″x1″ hammers.
24″ Mikro Pulverizer No. 4-TH, stirrup hammers.
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No. 4 and No. 6 Williams "Jumbo."
20″ dia. x 24″ Dixie, direct conn. 40 H.P. A.C. motor.
24″x20″ Jeffrey Type B-2 Shredder.
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No. 3 and No. 5 Jay Bee Mills.

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1—560 H.P. F-M, Model 33, Style M, 257 RPM, 4-cyl. 16″x20″, with magnetic clutch and pulley take-off. Used two years.
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8—3′x5′ Tyler Hummer, 2 deck, No. 31, enclosed.
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2—3′x7′ Simplicity, 2 deck, motor driven.
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1—4′x8′ Huron, 1 deck, V-belt drive.

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Hardinge straight side Rod Mills, iron lined, herringbone steel gears, enclosed gear drive units, charge of rods with each mill. Arranged for peripheral or trunnion discharge. In excellent condition and for immediate shipment.

LIME HYDRATOR

Weber type, made by Arnold & Weigel with No. 1 Raymond Bros. Lime Separator; also Kritzer.
One complete Hydrated Lime Plant.

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10′ Sturtevant; 8′, 10′, 12′ Gayco; 6′ Raymond; also 5′ dia. Raymond "Whizzer" for attachment to roller mill.
5′ Gayco.

BALL, ROD AND TUBE MILLS

Ball Mills: 3′x5′, 5x10, 6x6, 6x8.
Rod Mills: 4′x8′, 6x12 Hardinge, straight side.
Tube Mills: 2—5′x20′ Bonnot Co., silex lined.
1—5′x22′ Bonnot Co., silex lined.
6′x23′, 2—6′6x20′ Smidth, silex lined.
5′x22′ Allis-Chalmers, 5′x35′ Vulcan, both iron lined.

RAYMOND PULVERIZERS

2—4 roll High Side, located Toledo.
Nos. 0000, 00, 1 and 3, Beater type—also Nos. 55, 60, 90 Imp type, also No. 40 Imp with 6′ Centrifugal Separator.

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17-19 PARK ROW — Our Shops at Newark, N. J., Cover Eight Acres. — NEW YORK, N. Y.

FOR SALE

GYRATORY CRUSHERS: Gates, Allis-Chalmers, 5D, 7½D, 6D, 7½K; Austin-Western No. 5; Allis-Chalmers Superior No. 6.

LOCOMOTIVES Steam: 2—Baldwins 7x12—24″ gauge; 2—Davenports 7x12—24″ gauge; 1—Davenport 8x12—24″ gauge; 1—Whitcomb 6-ton Gasoline.

REVOLVING SCREENS: 48″x12′, 48″x16′, 40″x16′.
Worthington 16x9x12 Steam Fire Pump.
75-KW Burke-Ridgway D.C. Steam Generator.
No. 104 Northwest Crane 50′ boom.
225 KVA, 300 KVA Allis-Chalmers 3/60/2200 450 RPM Belt Driven Generators.
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All sizes gas, steam and electric hoists; road rollers; portable compressors; sprockets; pulleys; elevator buckets; belting; roller chain; take-ups; boots; idler and troughing rolls; wire rope blocks, one to six sheave; 8-ton over-head hand crane; locomotive type and vertical boilers; dragline; clam shell and orange-peel buckets; shoulder rollers.

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16 inch dredge, now pumping 150,000 yds. sand and gravel per month, located in North Mississippi. Available after August 1, 1941. Hull—steel, 24 ft. x 76 ft. x 5 ft. Ladder—65 ft., 16 in. AMSCO extra heavy duty counter flow pump, directly connected to 600 HP Westinghouse variable speed 2300 volt motor. Fully equipped with priming pump, high pressure pump for breaking down banks, etc., 5000 ft. pipe, submarine cable, pontoons, etc. Extra new shell, impeller, cutter head, etc.

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Avalon, Mississippi

FOR SALE

Equipment of Sand Pit at Hackettstown, N. J.
Complete Dredge Unit. Includes:
1—10″ F. H. Centrif. Pump. Used 3 weeks.
Priming Pump with motor and High Pressure pump.
1—200 H.P. Crocker Wheeler Motor. Primary and Secondary control. 440 V. 60 Cyl. 3 Phase 585 R.P.M.
10 and 7½ H.P. Motors.
Dredge Equipment (Grids, switch boxes, etc.)
250 ft. 10″ pipe.
600 ft. 1½″ galvanized pipe.
50 ft. 8″ pipe.
100 ft. 6″ pipe.
13 galvanized drums for pontoons.

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For Sale or Rent

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2—LITTLE GENERAL Combination Shovel and Cranes. Gasoline. ½ yd. capacity.
2—McMYLER 20-ton capacity Locomotive Cranes. Steam Operated. Standard Gauge. 50 ft. Booms.

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1—13A Telsmith Gyratory Crusher.
2—10A Telsmith Gyratory Crushers.
2—40A Telsmith Gyratory Reduction Crushers.
1—32A Telsmith Gyratory Reduction Crusher.
1—24″ Telsmith Cone Crusher.
1—19″ Kennedy Gyratory Crusher with Motor.
1—16″ Traylor Gyratory Crusher.
1—24″x36″ Type 14B Farrell Jaw Crusher.
1—15″x24″ Type 9B Farrell Jaw Crusher.
1—No. 55 Champion Jaw Crusher.
1—Set 16″x36″ Buchanan Rolls.
495′ of 36″ 7 Ply Conveyor Belt.
2—360 Cu. Ft. Worthington Portable Air Compressors.
1—8 Ton Wehr Roller.
1—10 Ton Buffalo-Springfield Roller.

BLUE BALL MACHINE WORKS
Blue Ball, Pa.

FOR SALE

KILNS: 8′x80′, 8′x110′.
DRYERS: 5′x35′, 5′x40′, 5½′x32′, 6′x40′, 6′x60′, 7′x55′.
CRUSHING ROLLS: 6″x5″, 24″x14″, 42″x16″.
JAW CRUSHERS: 16″x24″, 10″x36″, 10″x42″.
BALL MILLS: 5′x8′, 6′x6′, 5′x22′.
HARDINGE MILLS: 4½′x16″, 5′x22″, 6′x22″, 8′x30″.
RAYMOND MILLS: No. 0000, 00, 1, also 3, 4 and 5 Roller Mills.
HAMMER MILLS: Williams, Gruendler, Jeffrey, etc.
SCREENS: Tyler-Hummer, Sturtevant.
We Purchase Single Items to Complete Plants.

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1—200 KVA Westinghouse, 220/440 volts, 60 cycle, 3 ph. 900 RPM., pedestal type, direct connected exciter.
1—150 H.P. Westinghouse, 220/440 volts, 60 cycle, 3 ph. 1200 RPM., 80% P.F. with direct connected exciter.
2—250 H.P. Westinghouse, 220/440 volts 60 cy. 3 ph. 1800 RPM., direct connected exciter 80% P.F.
All reconditioned, like new.

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1 Ph. 60 Cy. Oil Cooled

3—1000 KVA Pittsburgh, 23500/4300
3—667 KVA G.E. 23000/2300/4000Y
3—500 KVA G.E. 23000/2300/4000Y
3—300 KVA Maloney 13200—460
3—300 KVA G.E. 2300/4000 Y 230/460
3—200 KVA G.E. 4600/2300—230/460
3—200 KVA WE&M SK 2300/4000 Y 230/460
3—150 KVA WE&M 2300/4000 Y—460
3—125 KVA WE&M 2300/4000 Y 230/460
3—KVA WE&M SK 2300/4000—230/460
3—100 KVA WE&M HK 2300/4000—230/460
15—50 KVA G.E. HK 2300/4000—115/230
1—75 KVA West. SK 2300/230/460
3—37½ KVA G.E. HK 2300/230/460
3—37½ KVA West. 2300/115/230
9—25 KVA G.E. HK 2300/230/460
7—25 KVA G.E. HK 2300/115/230
2—50 KVA G.E. H 6600/13200/230/460
3—15 KVA Pittsburgh 2300/230/460
1—10 KVA Pittsburgh 4600/2300/230/460
1—15 KVA Pittsburgh 4600/2300/230/460
1—100 KVA West. 4200/115/230
1—50 KVA West. 4000/115/230
2—37½ KVA Pittsburgh 2300/230/460
1—30 KVA West. 4400/110/220
6—15 KVA G.E. H 2300/230/460
1—25 KVA Packard 440/110/220
1—25 KVA West. 440/110/220
1—5 KVA West. 4600/115/230
1—30 KVA West. 2200/244/488

Approximately 300 other sizes and ratings available, from 50 KVA down to ½ KW.
A.C.-D.C. MOTORS—PUMPS—FANS—LOCOMOTIVES—COMPRESSORS AVAILABLE IN SCRANTON STOCK.

1—S. Flory single tight drum 54" Dx36" Fx8" flange, 1500 lbs. rope pull 800' per minute. 250 H.P. Double reduction steel gears.
1—Vulcan single tight drum 8'D x 5"F. x 10" Flange, 30000 lbs. rope pull, 1000 ft. per minute, single reduction herringbone gears, air brakes. 400 H.P.

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PENN ELECTRICAL ENGINEERING COMPANY
517 ASH STREET, SCRANTON, PA.

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1—No. 13A Telsmith Crusher with manganese non-choking concaves, in excellent condition..$1650.00
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Butler 100 yd. 3 compt. bin, weigh batcher.
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Northwest 1 yd. comb. shovel-crane, gas.
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AIR COMPRESSORS
BELTED: 355, 528, 676, 1000, 1300 & 1570 Ft.
ELECTRIC: 478, 676, 807, 1302, 1728 & 2850 Ft.
DIESEL: 105, 315, 420, 603, 807 & 1000 Ft.
PORTABLE GAS: 110, 160, 220, 310, 540 & 1300 Ft.
STEAM: 49, 310, 528, 1300 & 2200 Ft.

BUCKETS
50 Skips and Battleship Type, 2 to 6 Yds.
5 Owen & Bucyrus Rock Grabs.
CLAMSHELL: ⅛, ¾, 1, 1½ & 2 Yds.
ORANGE PEEL: ¾, 1, 1½, 2 & 3 Yds.
DRAGLINE: ½, ¾, 1, 1½ & 2 Yds. Cap.

CRANES & DRAGLINES
5 Ton BROWNHOIST, 30 ft. Boom Gas.
12 Ton NORTHWEST 50 Ft. Boom Gas.
12 Ton KOEHRING 45 Ft. Boom Gas.
16 Ton Speedcrane, Gas, 50 Ft. Boom.
25 Ton BROWNING & 30 Ton AMERICAN Locomotive.
25 Ton LINK BELT K-48 Electric, 70 Ft. Boom.
2½ Yd. Lorain Model 95, Diesel Dragline.

CATERPILLAR SHOVELS
½ Yd. P. & H. Gas & ¾ Yd. Insley Gas.
¾ Yd. KOEHRING Gasoline.
¾ Yd., 1¼ Yd., 2 Yd., 4 Yd. & 8 Yd. MARION Electrics.
1 Yd. NORTHWEST Gas & 7/8B2 Steamer.
1½ Yd. BUCYRUS 41B Steamer.
1½ Yd. Lima 750 Diesel.
1½ Yd. KOEHRING 601—Gas.

OIL DISTRIBUTORS' TRUCKS
3—1000 gal. ETNYRE Mack.

DUMP CARS
46—KOPPEL 1½ Yd., 24 & 30 In. Ga., V Shaped.
15—2 Yd., 3 Yd., 4 Yd. 36 In. Ga.
20—Std. Ga. 12 Yd., 16 Yd., 20 Yd. & 30 Yd. Cap.

BALL, ROD AND TUBE MILLS
6x8 Continuous Pebble Mill.
5x5 Batch Mill.
5′x22″ HARDINGE CONICAL Dry Ball Mill.
6′x22″ HARDINGE CONICAL Pebble Mill.
4x8, 8x6, & 10x9 Straight Ball Mills.
8′x22″ HARDINGE CONICAL Ball or Pebble Mill.
4x16, 5x18, 5x22, & 6x22 Tube Mills.
3½x8 & 5x7 Air Swept Tube Mills.
2x4½, 5x12 and 6x12 ROD MILLS.
4x16 Smidth Tube Mill Silex.
5½x20 Smidth Tube Mill Mang. Lining.
5½x18 P & M Tube Mill Silex.

PULVERIZERS
No. 1 Sturtevant Ring Roll.
RAYMOND Auto. Pulverizer No. 0000, 0 & 3.
RAYMOND Imp Mills No. 4, 32 & 55.
GRUENDLER XXB Mill & Jay Bee No. 3 & 4.
RAYMOND 4 & 5 ROLL MILLS & 5 Ft. Chaser Mill.

SEPARATORS AND COLLECTORS
14 ft., 8 ft. and 12 ft. Separators

ROLL CRUSHERS
36x60 Fairmont Single Roll.
36x20 Diamond Double Roll.
24x24 & 36x16 & 36x20 Diamond Double Roll.

JAW CRUSHERS
10x8, 13x7½, 14x7, 15x9, 15x10, 16x9, 16x12, 16x10, 18x11, 20x8, 20x6, 20x10, 20x12, 20x11, 26x12, 30x15, 30x13, 36x30, 36x18, 36x14, 36x15, 36x9, 36x6, 38x18, 36x10, 36x24, 42x9, 48x36, 60x42, 84x66, 36x16, 9x36.
30x10 Gruendler Roller Bearing.

CONE & GYRATORY CRUSHERS
18 in., 24 in., 30 in., 36 in. and 48 in. Symons Disc.
21K & 18N Allis Chalmers.
4—10 TZ Traylor 4 Ft. Gyratory.
4—Nos. 5, 3 & 6 Austin Gyratory.
2—Traylor T-12 Bulldog Gyratory.
8 in. Traylor T-3 Gyratory, Telsmith No. 9.
17 Gates K—Nos. 3, 4, 5, 6, 7½, 8 & 9½.
10 Inch Austin Model 105.
6, 10 & 13 Inch Superior McCullus.
KENNEDY: Nos. 19, 25, 27, 30 & 49.
16″ Traylor.
7 Ft., 5 Ft. and 3 Ft. Symons Cone.

DRILLS
4—SANDERSONS 14 & LOOMIS 44.
7—Ingersoll-Rand Wagon Drills, FB & M2.
29T ARMSTRONG Well Drill.

HOISTING ENGINES
7 Gasoline 15, 40, 60 & 100 H.P.
17 Steam 7x10, 8¼x10 and 10x12.
8 Electric 20, 35, 50, 60, 100 & 150 H.P.

HAMMER MILLS
4 Jeffreys: 24x18-A, 36x24-B, 42x36-E & 42x48-B.
Williams No. 1 Jumbo Jr., & No. 6 Universal.
Nos. 4, 6 & 8 Williams Jumbo.
No. 36 Am. Ring Roll.
Gruendler No. 6X.

STEEL BINS
72 Ton BLAW-KNOX 2 Compt.; also 250 ton.
100 Ton BLAW-KNOX 2 Compt.

CEMENT BIN
400 Bbl. Portable BUTLER Bulk Cement Bin with Fuller Full Automatic Electric Push Button Weigh Batcher.

SYNCHRONOUS MOTOR GENERATORS
100 K.W. RIDGWAY 3/60/2200-250-275 volt.
150 K.W. GEN. ELEC. 3/60/2200-250-275 volt.
200 K.W. RIDGWAY 3/60/2200-250-275 v., 900 rpm.

DIESEL GENERATORS
240 K.W. F.M. 3/60/2300 v.
300 K.W. Worthington 3/60/2400 v.
125 K.W. F.M. 250 v. D.C.

RAYMOND MILL
5 Roll High Side.

CONVEYOR PARTS
BELT: 1000 Ft. 60 In., 700 Ft. 42 In., 600 Ft. 36 In., 800 Ft. 30 In., 1642 Ft. 24 In., 517 Ft. 20 In., 297 Ft. 18 In., 1000 Ft. 14 In. & 16 In.
IDLERS: 36 In., 30 In., 24 In., 20 In., 18 In.
Head & Tail—Pulleys—Takeup for all sizes.
Steel Frames: 2,000 ft. 24 In., 30 In. & 36 In. Sections.

ROTARY DRYERS AND KILNS
36 In. x 20 Ft., 3 Ft. x 30 Ft., 4 Ft. x 30 Ft., 54 In. x 30 Ft., 42 In. x 24 Ft., 5 Ft. x 30 Ft., 5 Ft. x 16 Ft., 5 Ft. x 60 Ft., 6 Ft. x 60 Ft., 8 Ft. x 70 Ft., 70 In. x 40 Ft., 5x30 & 8x84 Double Shell Dryers, 8x110, 7½x100, 8x125 & 10x20 Kilns.

STEEL DERRICKS
GUY: 8 Ton 85 Ft. Boom, 15 Ton 100 Ft. Boom, 20 Ton 115 Ft. Boom., 50 Ton 100 Ft. Boom.
STIFF LEG: 5 Ton 70 Ft. Boom, 15 Ton 100 Ft. Boom, 25 Ton 100 Ft. Boom, 75 Ton 135 Ft. Boom.

LOCOMOTIVES
DIESEL: 7—4½, 8 and 15 Ton 36 & 42 In. Ga.
GASOLINE: 3 Ton, 5 Ton, 8 Ton, 12, 14 & 30 Ton.
STEAM: 9 Ton, 20 Ton, 40 Ton, 60 Ton & 80 Ton.
ELECTRIC: 2 Ton, 5 Ton, 8 Ton, 17 Ton & 40 Ton.

SCREENS
VIBRATING: 2x4, 3x6, 2x8, 3x8, 3x5, 4x5, 4x8, 4x10, 48x72. HUMMER, ROTEX, NIAGARA & ROBINS, LINK BELT & HURON.
REVOLVING: 3x12, 3x16, 3½x18, 3x24, 4x16 4x20, 4x22, 4x24, 5x30, 5x20, 6x20.

SAND WASHERS AND CLASSIFIERS
4 LINK-BELT A-60 In. Classifiers.
7 ALLEN Cones 4 Ft., 5 Ft., 6 Ft., 8 Ft.
30″ Reciprocating Plate Feeder.

RAILROAD CARS
12—50 Ton Cap. Battleship Gondolas.
7—50 Ton Cap. Flat Cars.

SAUERMAN DRAG AND SLACKLINES
1—¾ yd. Gas 1—1½ yd. Electric
1—1 yd. Electric 3—3 yd. 3 yd. & 4 yd. Electric

42 IN. BELT CONVEYOR
350 Ft. Barber-Greene Sectional Steel Frame Roller Bearing Belt Conveyor. New 1939.

JACK HAMMERS AND DRIFTERS
21 Worthington 169 Drifters.
12 Worthington 180 Drifters.
6 Gardner-Denver 15 Jackhammers.
45 Ingersoll-Rand Drifters S70, N75, X71, DA35.
11 Ingersoll-Rand S49 Jackhammers.

R. R. TRACK SCALE
125 Ton 56′ x 10′6″ Platform 4 Section.

WHIRLEY CRANES
5 Clyde 75 to 100 ft. Boom.

DRILL SHARPENERS
5 I.R. 4K Shank Grinders.
6 Ingersoll-Rand 54, 40, 50 & 34's.
7 Sullivan Class A. & C.
8 Gardner-Denver 3A & No. 6DS.

CONE CRUSHERS
Symons No. 5¼ and 7 Ft.

(Cable Address: "STANEQUIP" New York)
Lincoln Bldg., 60 E. 42nd St., New York, N. Y.
Murray Hill 2-3075 or 2-3076

R. C. STANHOPE, INC.

SURPLUS EQUIPMENT

AIR COMPRESSORS, 2-Stage with Motor
3—IR Imp. Type 10, cap. 600 cu. ft.
1—Sullivan WN-31, cap. 982 cu. ft.

BOILERS, Kewanee Steam Heating
1—2300 sq. ft. Type 750C.
1—2090 sq. ft. Type No. 83R6 with Oil Burner.

ELECTRICAL EQUIPMENT
3—300 KW, 600 V GE Rotary Converter.
1—300 KW, 600 V GE Switchgear (new).
3—300/450 KVA GE Transformers 22,000/445 V.

HOISTS
1—60 HP. Sauerman, PTE DD.
1—37 HP. Natl. 48 x 42 SD.
5—20 and 35 HP. Tuggers.
1—75 HP. Ottumwa 48 x 36.
1—100 HP. Ottumwa 54 x 78.

LOCOMOTIVES, Steam, Std. Ga.
3—50-Ton Std. Ga. Steam Baldwin.

PUMPS
1—1,000 GPM 325′ Hd. Cent.
4—4″ Dorrco Diaphragm.
2—3,000 GPM Deep Well.
1—1,000 GPM Deep Well.
1—1,650 GPM 2-Stage A-C.
3—Steam Pumps.

WAGONS, Crawler
10-Yd. Patt. Side Dump.
16-yd. Athey 2-Way Side Dump.

BUCKET ELEVATORS: Steel 320 Ton Cap.
CONVEYORS: Goodman A&B Shaker
CRANES: 2—20-Ton Loco. Type.
CRUSHER: 2′ Coarse Cone Std. Hd.
GOLD MACHINE: Ainley 4-Bowl.
JACK HAMMERS: RB 12 Auger L.H.
JIGS, ORE: 2-Cell Bendelari & Wood.
ROD MILL: Marcy 4 x 10 RH.
SCREENS, Revolving: 5′x8′ Trommel.
TRACK SCALE: 28′ Rail 100-Ton Cap.
TRACKSHIFTER: Std. Ga. Model N.
WATER TANK: 10,000 Gal. Steel.

BUTLER BROTHERS
PRODUCERS OF IRON ORE
137 East 8th St. St. Paul, Minn.

DIESEL PLANT

Available for Immediate Delivery

1120 H. P. FAIRBANKS-MORSE FULL DIESEL—MODEL 33 DIRECT CONNECTED TO A. C. GENERATORS

Offered by Owner Direct to User

***Address* BOX 802**

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FOR SALE

Derricks—Guys steel & wood 34-40′ booms.
Hoist—Clyde 2 drum and slewer, 35 hp.
Pumps—Centri. 3″, hose and pipe; Diaphragm 4″.
Pile Outfit—Steel leads, 2500# hammer, caps for piles, 3x12, steel & 2″ sheeting.
Air Compressor—Gardner 2—4½x4½, 15 hp.
Mixer 10S, barrows, carts, scale.
Boiler—20 hp. horizontal, on steel skids, fittings and hose.
Tar Pot, torch & kerosene tank.
Concrete breaker & tools, air tamper, hose 5″x15′ & extensions, steel buckets ½ yd., blocks, jacks, & all misc. const. tools.

R. E. LUNDGREN
1118 Mulberry St. Des Moines, Iowa

Jaw Crushers—4″x8″ up to 66″x84″.
Crushing Rolls—16″x10″ up to 54″x24″
Gyratory Crushers—No. 3 up to Mammoth
Ring Roll Mills—No. 0, No. 1, No. 1½ and No. 2.
Swing Hammer Mills.
Rotary Fine Crushers—No. 0, No. 1, No. 1½ and No. 2.
Direct Heat Rotary Dryers—3½′x25′, 4′x30′, 5′x30′, 5½′x40′, 6′x50′, 7′x50′ and 8′x50′.
Semi-indirect heat Dryers—5′x30′ and 8½′x 75′.
Cement Kilns—3′ up to 8′ diameter.
Hardinge, Marcy & Fuller-Lehigh Mills.
Raymond Mills—No. 00, No. 0, No. 1, No. 2 Roll.
2—6′x12′ and 1—4′x10′ rod mills.
Tube—Rod and Ball Mills—3′ to 6′ diameter.
Vibrating Screens—Air Separators.
1—4′x4′ and 8′x6′ ball mills.
New Dryers built for all purposes.

W. P. HEINEKEN
277 Fulton St., N. Y. Tel.: Barclay 7-7298

FOR SALE

LOCOMOTIVE: American 4 wheel, 40 ton Steam Saddle Tank, 190 lb. boiler, excellent condition.

DUMP CARS: Two Clark 30 cu. yd. capacity Air Dump Cars, good condition.

Smith 56-S Tilting Type Concrete Mixer, 2 cubic yard capacity, excellent condition.

E. E. FORT
1119 S. 56th St. Philadelphia, Pa.

OWEN-EQUIPPED *Mobile units* BOOST GRAVEL PLANT *EFFICIENCY*

WHETHER it's shuttling up the track to the pile for a capacity grab of dry gravel, or just a matter of swinging the boom and dropping that OWEN into the water pit for a mouthful of dripping aggregate,—one thing is certain; for greatest daily output with minimum operating cost "OWENIZED" mobile units are requisite.

The **OWEN BUCKET** *Co.*

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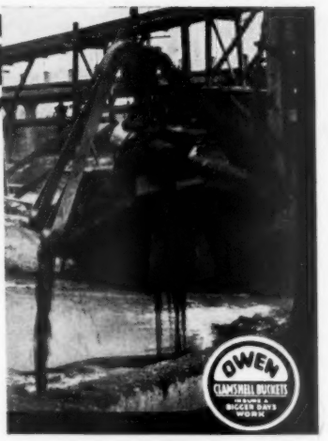

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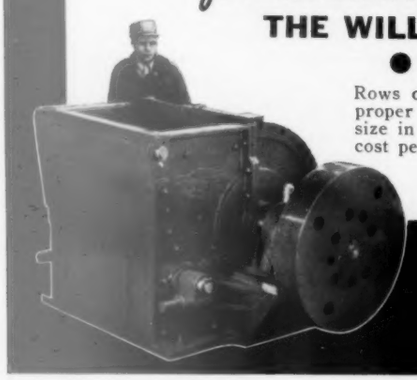
for Making 1¼", ¾" *or Agricultural Limestone...*

THE WILLIAMS "SLUGGER" CRUSHER AND PULVERIZER

● Handles Large Stone or Screen Rejects ●



Rows of heavy, free swinging, fast revolving hammers, crush the material by impact until of proper size to pass through the grates. By reducing large rock to 1¼", ¾" or agricultural size in one operation, the "Slugger" has enabled operators to produce these sizes at a very low cost per ton and with small investment. Seven sizes—6 to 150 tons hourly capacity.

The Williams Patent Crusher and Pulverizer Co.

802 St. Louis Ave. St. Louis, Mo.

OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD

WILLIAMS

PATENT CRUSHERS GRINDERS SHREDDERS

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ROLLER MILLS
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SHREDDERS

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UNIFORM IN QUALITY This is a universally acknowledged characteristic of American Cable's Wire Ropes.

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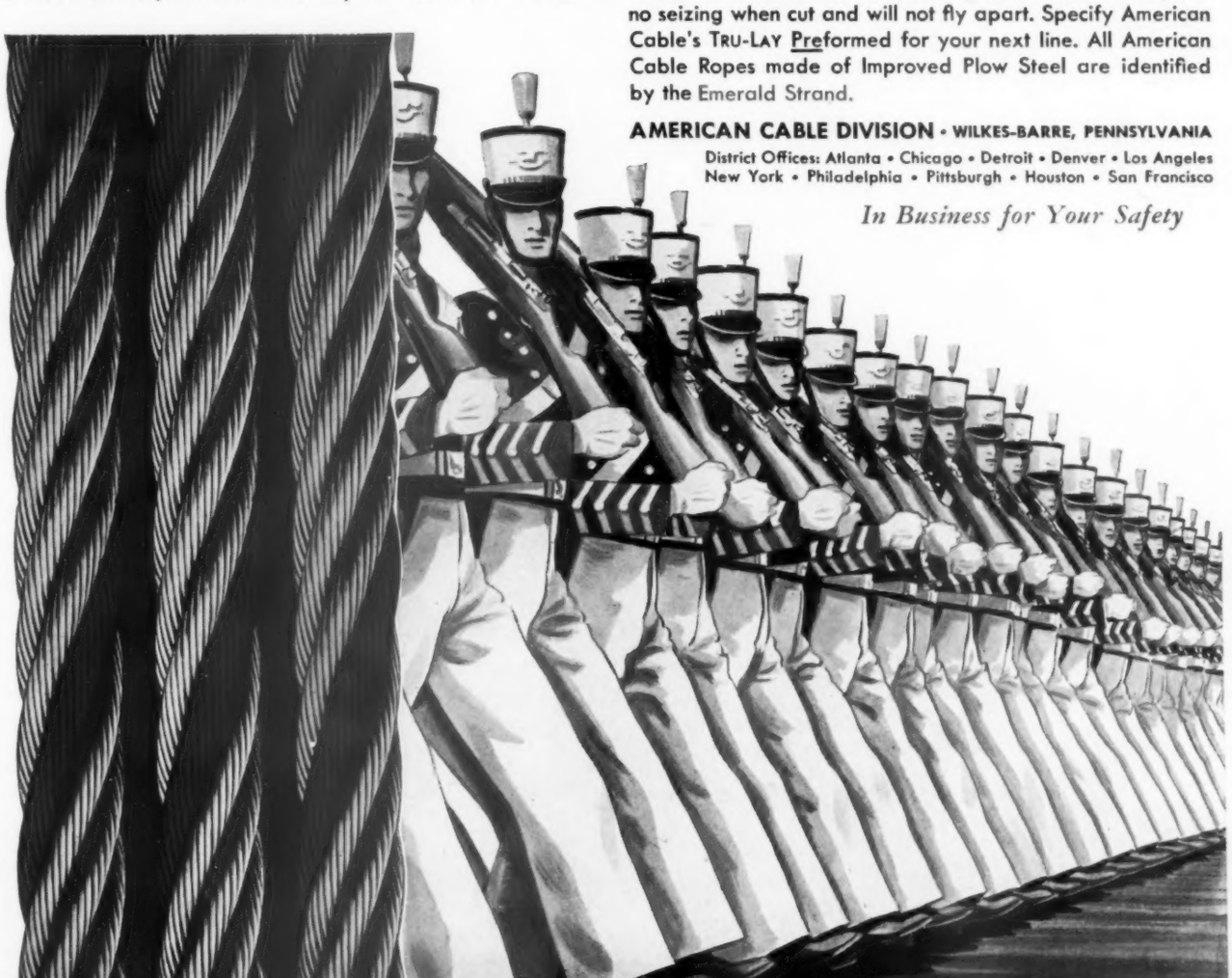

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How STRENGTH* replaces MASS with [SC]² Concrete

*Building codes are changing. The trend is toward concrete specified by strength

In the Motor Capital

Detroit, Mich., specifies concrete by strength. In three modern plants the Koeing Coal & Supply Co. produces $(SC)^2$ concrete of absolute uniformity.

In the New York Area

The Cranford Material Corp., Brooklyn, N. Y., Bridgeport Concrete Co., Bridgeport, Conn., and the C. W. Blakeslee & Sons Co., New Haven, Conn., are making better concrete with the $(SC)^2$ method.

Where Water Is Power

For the Saugatuck Dam of the Bridgeport Hydraulic Co., $(SC)^2$ methods are controlling the production of all concrete used on this modern structure.

There are no guesses—no human errors and no batching failures in $(SC)^2$ precision mixed concrete. Every batch meets the most rigid specifications of design and construction engineers. The guaranteed moisture variance is less than 1/4%. And, 2500 pound concrete is produced with less than 400 pounds of portland cement per yard.

$(SC)^2$ precision proportioning equipment provides

Accurate determination of the moisture in the aggregates.

Automatic correction for this entrained water.

Precision weighing of all concrete ingredients with electric cut-off if desired.

And, an automatic graphic record of the delivered weight of every ingredient in every batch.

Since $(SC)^2$ was first used in 1931, leading members of the American Society of Civil Engineers have said, "Have never before seen a mechanical set-up producing such uniformity in the resulting concrete," and "Our test cylinders seven days old showed an average compressive strength of 2800 pounds."

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McLachlen Building • Washington, D. C.

SCIENTIFIC [SC]² CONCRETE

SCIENTIFIC CONCRETE SERVICE CORPORATION WASHINGTON, D.C.

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